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## EDITORIAL NOTES.

### Practical Hints for Building Large Gasholders.

THE lecture that Herr E. Körting delivered before the members of the German Association, at their recent annual meeting, was last week the subject of comment, in regard to various general and technical points; but an examination of the practical hints that he gave concerning the building of large holders was reserved for a separate article. There is one preliminary point before entering upon a little criticism, and it is as to requisite storage capacity under the conditions existing at the present time, when there is a more equable distribution of gas than hitherto during the twenty-four hours. Herr Körting places the requirement at 60 per cent. of the maximum day's consumption; and a correspondent who has made a wide survey of the current demand conditions and their relation to storage, says, in his opinion, the storage capacity need not be equal to more than 75 per cent. of the maximum day's output. This applies to the governing conditions of the present; but if in the future we are going to continue to displace solid fuel by gaseous fuel for domestic heating—that is the line of greatest promise—there is, as was pointed out last week, the chance that in a few years from now, owing to erratic demand through uncontrollable atmospheric temperatures, safety will claim a further revision of the ratio of storage to demand.

Coming to the "practical hints" in the lecture, Herr Körting first suggests that it is advisable, with flat-bottomed tanks, to dig the foundations so that they slope evenly up to the centre point to a height of 100 to 150 mm. (say, 4 or 5 inches), in order that, if there is any sinking of the ground underneath when the tank is filled, the bottom of the tank shall not be unduly curved outwardly. There is no objection to be raised to this—in fact, the idea appears to be good, although one fails to see any more reason why the foundations should sink in the centre of a flat-bottomed tank than at the periphery, where the whole of the weight of the guide-framing and tank sides has to be carried in addition to the water-load. In regard to hints Nos. 2 and 3, these are usual; and therefore do not call for comment. But as to the fourth practical recommendation—relating to the fixing of the tank ring to the bottom being best accomplished by means of two circular angle-pieces, this need not be taken as imperative, as the outer angle-ring is an advantage only under certain conditions. We are glad to see that Herr Körting emphasizes, in the fifth hint, the importance of due consideration being given to what he terms the "secondary" stresses, of which sight is often lost. For an example of the ignoring of stresses that play an important part in gasholder construction, there is no need to go further back than the Ilkeston inquiry. There is something that is a little vague about the latter part of the sixth hint, in which Herr Körting refers to the jointing of the high quality ingot (steel) plates, of which he speaks so highly. He states that "the jointing of these plates is best effected by double rows "of fish-joints of ordinary quality iron, so arranged that, for "every metre of height, the breadth of the plates is only re-"duced by one rivet hole—94 to 96 per cent. of the breadth "thus remaining for use." Of course, this does not mean that the strength of the joint is 94 to 96 per cent. of the solid plate—as might appear at first sight; but that the horizontal fish-plates only cover up from 4 to 6 per cent. of the area of the plate. There is nothing unusual about that. The great trouble with all metal tanks is to make the vertical joints (not the horizontal ones) anything approaching in strength that of the solid plate. There is so much waste material, so to speak, buried in the plate which is non-effective because of the weakening effect of the vertical riveted joints. [In this connection, it may be mentioned that the 28 mm. plates alluded to towards the end of this "hint" should have been translated as 1⅛-inch plates, and not 0·09-inch.] In the seventh hint, Herr Körting suggests that, at the top edge of the tank, overflow-pipes should be introduced with the ends inside the tank as near the bottom as possible, in order that the longest standing water might overflow first. This is a good suggestion for keeping the tank water fresh; and, although it is so obvious, we do not recollect meeting with it before. In this composite seventh recommendation, it is also suggested that, to guide the lifts of a holder, twice as many strong rails should be fixed on the inside of the tank as there are main guides. Of course, intermediate tank-guides are now invariably employed.

A point or two may be made on the eighth and tenth hints together; and, as the ninth one goes without saying, the dual treatment is facilitated. In the eighth one, Herr Körting urges that the guide-framing should be so arranged that the plates of the tank are not affected by its weight; and, in the tenth, that it is best to carry right to the tank foundation any stresses caused by the wind. This is sound advice; but it is often ignored in England. One, for instance, somewhat frequently sees diagonal bracing which, instead of being carried down to the ground-line, ends at the top edge of the tank, with the result that the wind stresses are taken up by the tank-plates. The guide-framing should have, as Mr. F. Southwell Cripps has so often advocated, an entire independence of the tank for its support. As part of the tenth set of hints, it is to be noticed that Herr Körting advocates the arrangement of horizontal girders, so that, when the holder is fully inflated, there is a line of girders on a level with the top of each cup; this forming a convenience for the inspection of cups, rollers, &c. All things being favourable, there is no question as to this being a good plan; but various considerations often militate against putting girders the same vertical distance apart as the depth of each lift. In regard to hint No. 11, in which Herr Körting speaks of the relation of holder pressure to the water-seals of apparatus on the works, he points out that the latter must be high enough for the heaviest pressure of the holders. This also goes without saying; but the lecturer proceeds to remark that the pressure of four-lift holders varies "from 260 to 400 mm., and more." The last-named figure (without the "and more"), being the equivalent of about 16 inches, is an enormous pressure for any four-lift holder to throw. If such a pressure were to be given, it would suggest that the proportions of the holder were very uneconomical. The twelfth set of recommendations refer particularly to the top curb of the inner lift, and the riveting of the crown. There is one remark to the effect that "the stress between roof and sides must be sufficient to "prevent the curb buckling up." The words are somewhat ambiguous; and surely what Herr Körting intended to convey was that the allowable stress in the top curb must be insufficient to buckle it. There must be dissent from the recommendation that the crown should, in all large holders, be riveted in double rows. The strong rows of crown plates forming the top curb in large holders should undoubtedly be butt-jointed and "riveted in double rows;" but there is no necessity for this in the crown sheeting. Single riveting is ample if the rise of the crown is sufficient; the stress on the crown sheeting being perfectly uniform and unvarying throughout. In this twelfth set of hints, in our translation there was an error in conversion. In speaking of the sides of the lifts being constructed of plates 2½ to 4 mm., these measurements were rendered as 0·008 to 0·01 inch thick; while the equivalents should have been 0·098 to 0·157 inch thick. The statement in hint No. 13, that the cups are now "always" made of U iron, would have been more accurate if the word "frequently" had been used in place of the word "always."

This brings us to paragraph 14 of the "hints;" and here the reasoning appears to be of a somewhat doubtful order. The statement is: "For guiding the inner lift, radial and "tangential rollers are used, or very often both; whereas

"the other lifts have mostly only radial rollers. The tan- "gential system applied to the latter is theoretically and "practically not advantageous, owing to the tendency of the "rings to give." Now the top curb of the inner lift "gives" far more than the cups and dips. The former compresses $\frac{1}{12000}$th part of its length for every ton per square inch stress upon it; and this may amount to 1½ inches, or more, diametrical reduction in a 300 feet diameter holder. The cups may spring; but they should be so bracketted to the vertical guides and stays in large holders by means of the roller carriages as to make it practically impossible. Then the tangential rollers would be useful in steadying the holder, and distributing the stresses when the cups and dips are locked together, quite as much as on the inner lift. Reverting to the interesting question of the compression of the curb of the inner lift in relation to the stress upon it, the compression figure of $\frac{1}{12000}$ part of its length for every ton per square inch stress upon it is obtained from Mr. Cripps's book on the "Guide-Framing of Gasholders," in which this point was made, we believe, for the first time. Mr. Cripps wrote:

> Iron shortens or lengthens about $\frac{1}{12000}$th part of its length for every ton per square inch strain upon it. This property of the elasticity of iron is very apparent in a large gasholder. For example, take the shortening of the top curb of a gasholder 200 feet diameter. The circumference in inches would be 7540, $\frac{1}{12000}$th of which is 0·628 of an inch. Therefore, the curb would shorten 0·628 of an inch for every ton strain; and as top curbs are frequently strained up to 4 tons per square inch (sometimes a very great deal more), the total shortening would be at least 2½ inches, which means a reduction in the diameter of more than ⅝ inch. It follows, therefore, that the top rollers are off the guide-face by ⅝ inch all round, when the holder is right up and the curb is fully strained.

It is a great pity that the book from which this quotation is made is, to use one of the formulæ of the book publisher, "out of print." Many there are who would be glad to have it revised to date. The author might kindly take the hint. As to Herr Körting's suggestion No. 15, it need only be remarked that handrails are advantageous, but special care must be taken to fix the standards in such a manner that they will not cause a leak where bolted to the grip-plates. The standards exercise very considerable leverage, and may easily wriggle a leak. Upon the final suggestion, which deals with the position of inlet and outlet pipes and schemes for mixing the gas in holders, in the plans both inconvenience and extra cost are to be seen; and therefore there should be avoidance of them wherever possible. The best scheme of all, where it can be done, is not to send gas into a holder at the same time that it is delivering gas into the distribution system.

Not much use would be served in further commenting, on this occasion, upon the question of gasholder costs. Just as heaviness and weakness are often found coupled together, so are lightness and strength. Hence everything is summed up in the words "correct design." In every case, there is a best and most economical design to suit the particular conditions; and it is the function of the expert to determine that design. Herr Körting, as we pointed out last week, bears testimony to the value of the specialist consulting engineer in connection with such work. By-the-bye, some reference was made in last week's article to the East Greenwich 12 million cubic feet holder; and, as is well known, New York has exceeded this size by one of 3 million cubic feet. Is there any chance of seeing the precedence of England re-established by the construction of a 20 million cubic feet holder?

Although this article is a little critical in places, Herr Körting will recognize that the points raised are not of such importance that they constitute destructive criticism; but rather it is intended that they shall be suggestive and (if acceptable) emendatory.

## Higher Temperature Retort Material.

Are we on the eve of obtaining a retort material that will stand higher temperatures than those generally employed at present (even though produced to the specifications of the Refractory Materials Committee)? The outlook is more than hopeful; it is promising. Indeed, it seems that those engineers who, like Mr. W. B. Randall, of Waltham Abbey, are desirous of working their settings, without melting them down, at higher temperatures in the combustion chambers and retorts, so as to squeeze (say) 16,000 cubic feet of gas from a ton of coal, are likely soon to find themselves on the high road to realization. It is, of course, all a question of material that will give a good working life under the increased temperatures. At the recent meeting of the Institution of Gas Engineers, both Herr E. Körting and Mr. R. M. Searle referred to the successes that carbonizing engineers are achieving in America by the use of silica material; and, prior to the meeting, our attention had been arrested by allusions to the subject. In our "Correspondence" columns to-day, there appears a letter about it by "C. E." For the present, till it is advisable to make a more definite announcement regarding the silica material produced by a new process to which he refers, our correspondent desires to maintain his anonymity. But it is only fair to him to say that it was away back in September last that private communications were first passing between him and ourselves regarding the new process of preparing silica material, and that practical experimental work in retort-settings with the latter has since been under way. It may even be found that this particular silica material is an advance upon that which is now being used in America.

It is impossible to do anything more than write generally about the matter at the present time. In our correspondent's letter, he himself adopts a reticent attitude, and does not divulge the treatment under which he puts silica material so as to, practically speaking, eliminate the greatest trouble to which it is ordinarily subject under any sudden changes of temperatures such as must occur during the intermittent charging of retorts—that is, cracking and flaking—while maintaining the heat stability of the material, and ensuring that there is no further appreciable expansion *in situ*. Our correspondent has evidently gone to work in a methodical way in studying the properties of lime-silica material which cause it to expand very readily *in situ*, and crack and flake under violent changes of temperature; and he has, so far as available information enables us to judge, been successful in not only ascertaining the causes of failure, but (so we read between the lines of his letter) the means of, sufficiently for the purpose, eliminating from the material the properties that contribute to failure under high and rapidly varying temperatures, such as occur when putting into a retort a cold charge. Now he is able to write: "There is a new form of "silica brick, which is absolutely free from each and every "undesirable feature of lime silica, and which, it is be- "lieved, will eventually cause as great a revolution as "vertical retorts." We know that Welsbach did not make a satisfactory mantle until he separated the ceria from thorium, removed from it the impurities, and returned it in proper proportions as pure ceria to the thorium. It may be found that "C. E." has been following very much the same line of action; for he points out in his letter that silica is, as a rule, "contaminated with the oxides of alumina, iron, lime, mag- "nesia, potash, and soda. . . . Lime is, therefore, by "no means the most desirable addition to make to silica "aggregated—particularly if the latter be impure." He also speaks of tests made from an "impure" silica; and tests made with material (from the same raw stuff) produced under the new process. However, it is no use speculating over the new material until "C. E." is in a position to throw more light upon it; but he does tell us that an analysis of bricks (made by the new process) in the laboratory of a large gas-works gave 94 per cent. silica.

The material is at the present time, being practically tested in connection with a new installation of retorts; and the latest information is that it is, under the conditions of daily operation, conducting itself in a satisfactory manner. Tests on a smaller scale, under working conditions, with isolated samples of the material, have also produced good testimony. Dr. Mellor (whose work is well known in connection with the Refractory Materials Committee) has proved the fire stability and the lowness of the expansion of the new material; and in other comparative tests in the flue of a furnace (in which the high temperatures of 1750° C. to 1800° C. reigned during the day—the fire burning out at night) a well-known brand of brick went to pieces in six days, while a brick made under the new process from an inferior, impure silica, remained in position for twelve weeks, and was then found but slightly affected by the gases. At the Institution meeting Mr. Randall spoke of a temperature of 2400° Fahr., in the combustion chamber, and 2000° Fahr. in the retorts. The temperatures to which the new material has been subjected in the flue referred to are equal to 3182° and 3272° Fahr. Therefore, the 16,000 cubic feet per ton men will look hopefully to "C. E." assisting them in constructing the way to the attainment of their aspirations. We hope it will not be long before something more definite reaches us from the pen of our correspondent.

## Feld's Thionate Process.

PURIFICATION bulks largely in the technical gas field at the present time; and things threaten to take quite a revolutionary turn. In the last two issues of the "JOURNAL" in June, we had Signor A. Pacchioni's paper on the Feld ammonia and purification system; Dr. W. B. Davidson, in his Institution paper, told us of the liquid purification process he has in hand; Mr. Charles Carpenter, D.Sc., has explained the catalytic system developed at the South Metropolitan Gas-Works for the reduction of carbon bisulphide in gas; and there has been described by Herr Kuckuk the "Athion" process for removing carbon bisulphide from gas by alkalinated cellulose. Our immediate concern is with Herr Feld. We welcome him in our "Correspondence" columns this week. He is a man who works hard in research; he invents and improves; produces shoals of patent specifications; carries out experiments on the large scale; but it is difficult to get from him much (if any) information as to what he is actually doing. We are therefore indebted to Signor Pacchioni for having drawn him out, even though he has done so by statements that Herr Feld considers call for some qualification. To supply this qualification is the object of the letter that is published in our columns this week, and incidentally we have the inventor giving us more interesting information about his thionate process, which he looks upon as being ahead of his sulphatation process. Signor Pacchioni's investigation resulted in agreement with Herr Feld's claim as to the complete ammonia efficiency of the thionate process; but he was not satisfied on the claims as to the efficiency in respect of the removal of sulphuretted hydrogen, and the cost of working the process. He also considered the chemical control necessary for the new process was of a character in excess of what a small works could command, and that therefore the direct sulphatation process would be preferable.

Naturally, Herr Feld has strong belief in the latest of his developments, and in its superiority to all that has gone before. Between his position and that of Signor Pacchioni, we cannot possibly judge, as beyond the printed information, including limited working experience, combined with laboratory experiment, there is nothing but calculations on a hypothetical basis on which to go. Nevertheless, the testimony has sufficient foundation to excite curiosity and a desire to obtain more positive information. In the first place, there is the confirmation by Signor Pacchioni as to Herr Feld's claim that the thionate process effects the complete absorption of ammonia from the gas. Then Herr Feld also asserts that so complete is the extraction of sulphuretted hydrogen that gas-works will be enabled to reduce dry purification by about nine-tenths of what it is at the present time—in other words, by the polythionate solution that he uses, he claims to be able to absorb as much as 89 per cent. of sulphuretted hydrogen, and reduce it to pure sulphur, without using any material extraneous to the gas. If he can accomplish this, he will be doing remarkably well. But Herr Feld, we are afraid, will himself raise a little suspicion by the care exercised in his letter to disabuse the minds of his readers that he is pitching his claims too high; for in another part of the letter the 89 per cent. is reduced to "at least" 80 per cent., while only 60 per cent. is guaranteed. Even so, it follows that the ordinary gas purification plant is considerably relieved, and hence the reduction in equipment in this respect. At the present time, purification costs are regarded as respectably low; but here Herr Feld speaks of purification costs, by the incorporation of the thionate process in the gas-works plant, being reduced to ½d. per 100 cubic metres—that is to say, 0·142d. per 1000 cubic feet. This looks too good to be true.

There is another very attractive claim. We know that one of the grounds upon which liquid systems of ammonia purification have failed has been the serious loss of ammonia. In this thionate system, Herr Feld declares that he will not lose more than 2 grammes of ammonia per 100 cubic metres of gas—this, in fact, will be the normal figure. In his letter, it is pointed out that this is better efficiency than the old water process; the loss of ammonia in which varied from 5 to 50 grammes per 100 cubic metres. But what about the process that Dr. Davidson introduced at the meeting of the Institution, in which he claims a 99½ per cent. efficiency with water?

As to the financial aspect of the new thionate process, Herr Feld gives in his letter an estimated comparison of the profit from the new process and the direct sulphatation system—taking a carbonization of 100,000 tons a year. This he does to disprove the statement of Signor Pacchioni, that the new process is not more economical than direct sulphatation. The result is that the net profit on ammonia by the direct sulphatation system is equal to about 1s. 8d. per ton of coal; while with the thionate system the net profit on ammonia and sulphur is equal to 2s. 6d. per ton of coal, under the circumstances and prices detailed. That, however, is working the plant on the 100,000 ton scale, and at its maximum capacity. It is an estimate, and the items should naturally have critical consideration. However, the system is very fascinating, as are most of the proposals with which Herr Feld has been intimately associated.

## Lighting of Schools and Libraries.

THE two Committees appointed by the Illuminating Engineering Society to consider respectively the illumination of schoolrooms and libraries appear to have some difficulty in arriving at any very settled conclusions; and it will perhaps be just as well if their final recommendations in the matter of minimum illumination are somewhat general and not too positive. Both Committees have issued interim reports, which incidents show they are still in the land of the living. But the distance they have marched towards the objects for which they were elected is not great. In fact, it would have been quite easy for anyone who has made any study of the subject to have straightway written reports on similar lines without conference with the estimable gentlemen forming the two Committees. The main good, however, that will result from the deliberations will be to start the flow of the subject of illumination in its scientific aspects through representative scholastic and librarian channels; and the work should also suppress haphazard illumination, and give to schools and libraries systems of lighting that are good and suitable, and that will not contribute to what is one of the marked evils of the age—increasing defective vision. But apart from principles, it seems clear that the Committees in question will do no good by being too dogmatic or definite in respect of illumination quantities. The difficulties are too great to permit of this; and though both Committees have mentioned minimum illuminations, it is patent that they are obsessed by the diverse factors of human requirement, of character of occupation, and of the elements composing that occupation. If all these factors are to be met by the measure, then either school rooms and libraries must be fitted by a multiplicity of units of light for use according to requirement, or there must be a number of rooms lighted for, and assigned to, different purposes.

Excepting, however, in peculiarly favourable circumstances, this would be economically impracticable; and therefore what the Committees must consider is not how rigid they can make the rules they lay down, but what are the degrees of illumination that will give the greatest latitude in the use of rooms by meeting, in the one scheme of illumination, the greatest range of need. For instance, in the interim report on the lighting of schools, the Committee recommend 2 foot-candles (the gas representatives urged 2½) as the minimum illumination for clerical work and reading and writing on any desk; while for such close work as stitching, drawing, &c., a minimum of 4 foot-candles is suggested. Another degree of minimum illumination must be taken for the blackboard, maps, &c.; and this has to be determined by the size of room and the distance away of the most remote students. Here, again, the nearest students would have a minimum illumination greater than they need. There is, in formulating rules of the kind in view, the danger of impracticability. The same difficulty is met with in the Library Committee's interim report. For the illumination of tables, desks, or newspaper stand lighting, a minimum illumination of 2 foot-candles is recommended; but for small type 5 foot-candles. Are there to be separate sections of libraries set apart for the reading of print in large and small type? Are there to be a collection of units of light so that the reader can increase or decrease the minimum illumination to his requirements; or are the Committee prepared to say definitely that the only system of illumination by which different minima can be secured at will is that controlled by a local gas-tap? There are also minima suggested (as will be seen in the reports reproduced elsewhere) for other purposes.

To speak plainly, the Committees seem, now that they are getting to close quarters with their reference, to be a little timid of what they have to do. The Schools Com-

mittee, for instance, have had before them information as to direct, indirect, and semi-direct systems of lighting; but they have as yet hesitated to come to any conclusion on these aspects of the subject. But both the Schools and the Libraries Committee speak of the necessity of the avoidance of glare, and of polished or glazed reflecting surfaces, such as desks, walls, blackboards, paper, &c. Dead surfaces are always better for the eyes than sheeny ones. With a warning against glare, both Committees defer the positive consideration of, and recommendation upon, the matter; the Library Committee feeling some restraint, owing to the developments constantly taking place in the methods of illumination and the necessity for fuller information as to their respective merits. Is this an excuse, or what is it? Surely the systems of illumination have advanced sufficiently for the Committees to tell school authorities plainly which of the two principal modern lights possesses the greater intrinsic brilliancy per unit of incandescent area; and surely they now know something about the spectrum of each light. With this information before them, why cannot the Committees—particularly the School Lighting Committee—say that it is imperative, in defence of the eyes, that with the one form of lighting greater precautions should be taken than with the other? If the Committees set out with the honest intention of being useful (and we believe they did), then let them also be bold. The Schools Committee do suggest that protective globes and screens should be used. But if they define the minimum illumination necessary for different work, why not indicate, in a serviceable way, that the degree of the translucency of eye-protecting shades or screens must vary according to the characteristics of the source of light? Otherwise, with one source of light, there will be a loss of economy. The platform is an impartial one; and the testimony of impartiality may as well find expression in usefulness, by the fullest guidance on the scientific side of the line which separates from the science of illumination the purely commercial considerations.

## Paris Gas Supply Last Year.

In another part of the "JOURNAL" will be found some particulars extracted from the report of the Directors of the Paris Gas Company for the past year, which was recently submitted to the shareholders. Though not quite so full of detail as reports issued by the Company's predecessors, whose area of supply was larger than that now served, it furnishes abundant proof of the popularity of gas, and of the determination of its suppliers to increase it. The number of consumers at the close of last year was 20,042 more than on Dec. 31, 1911; and, curiously enough, this was within 154 of the increase recorded for the twelve months ended at the above-named date. There is one consumer to every four inhabitants of the city. The quantity of gas sold was 4·72 per cent. higher than before; the total being about 15,840 million cubic feet, of which nearly 7332 millions were used in the daytime. An important feature of the past year's working was the extension of high-pressure gas lighting in the public thoroughfares; the number of light-centres being increased from 368 to 670, and the illuminating power by about half-a-million decimal candles. The Directors are pushing the sale of gas in every possible direction—particularly for the heating of bakers' ovens—and are instructing consumers as to the best way of using it for culinary purposes. The works and plant are being extended to meet the future demands upon them. Turning to finances, the total revenue was £4,361,568, compared with £4,252,031 in the preceding year—an increase of £109,537—and the expenses came to £3,423,135; so that there was left a balance of £938,433, which goes into the municipal exchequer. The Company received £63,474 for carrying on the concern, and at the close of the year they had £75,888 for disposal. This allowed of the payment of 5½ per cent. dividend for the year, with a carry-forward of nearly £10,000.

## The Dutch Association Meeting.

The Vereeniging van Gasfabrikanten in Nederland, which includes the trading side of the profession as well as the technical, completed forty years of its existence last week. A short account of the forty-first annual general meeting appears elsewhere in our columns to-day. It will be noticed that the technical portion of the meeting is not very heavy, and that the two days on which the gas men come together in the year amply suffice for all requirements. The Dutchmen seem to have a way of doing things easily and comfortably, and, without in any way skimping the work that they set themselves to do, they waste no time about it, with the result that the programme is kept well up to time, and ample opportunity is left for social intercourse, which the members seem to appreciate to the full. Great credit is due to the President, de Heer Bolsius, for the able way in which he conducted the meeting. While allowing everyone to have a fair say, he kept the speakers to the point, and nipped in the bud any tendency that was shown to wander and waste time. It will be noticed that there are no long papers, and the three that were read were not such as to give scope for much discussion. The questions down on the programme to be put to the meeting were in most cases introduced by speeches which were short and to the point. If any member had a criticism to make or a point to raise, he did it in the same way, directly and without any beating about the bush, and received just as terse a reply from the first speaker—an example which might be taken to heart by many who expect more than their fair share of time at our meetings. The social functions were delightful, and, at the dinner on Thursday evening, the Dutchmen showed that they can be truly merry and bright. Moreover, the speeches were all interesting and of the right after-dinner order. We must not conclude without mention of the new gas-works which were inspected, and which present features that were new to many of those present. De Heer Sissingh, the Chief Engineer to the Corporation, is to be congratulated on the excellent fruits of his labours.

## More Municipal Gas-Works Results.

The reports of the working of gas undertakings in the hands of local authorities for the past financial year, which have extended over the numbers of the "JOURNAL" issued during the last two months or so, must be now nearing an end. They have provided satisfactory reading for those directly or indirectly concerned in them; and a perusal of them convinces one that the business of gas supply is likely to long retain the position which, speaking generally, it now holds of being the most profitable branch of municipal trading. The announcement of record sales at Bolton is accompanied by an intimation that the Committee have decided to instal nine settings of vertical retorts on the Woodall-Duckham system. In round figures, there is a net profit of £40,000, of which £25,000 goes in relief of the rates, and £15,000 is allocated to depreciation and renewals. While at Droitwich the gas manufactured shows an increase of 7·7 per cent., the sales during the year were more by 10·8 per cent.—the largest annual increase experienced since the Corporation took over the undertaking. An increase in the sale of gas of over 4 per cent. is reported from Edinburgh; this being substantially more than the gain reckoned upon at the time the estimates were drawn up. At Hereford, nearly 3½ per cent. more gas was sold last year; and out of the profit realized, a sum of £1000 has been transferred to the improvement fund. Quoted figures indicate all-round progress financially at Morecambe; and out of a net profit of £2000, the district fund is to benefit to the extent of £1200. A net profit of £1200 has resulted from the year's working at Oldbury; and this is to be carried forward to the next account. Notice has been given of a resolution for the next meeting of the Council to the effect that, owing to the advance in the cost of coal, the price of gas for power purposes should be increased by 1d. per 1000 cubic feet.

## Advances all Round.

Consumption increases very satisfactorily at Oldham. One branch—the cotton mills—shows a slight falling off, it is true; but this is due partly to the further adoption of high-pressure lighting, and partly also to labour disputes which have interfered with work at the mills. On the year's trading there is a net profit of £16,500, from which is deducted £7500 for transference to the borough fund, and £1650 for depreciation on gas cooking-stoves. Growing demands for gas at Ossett are rendering the manufacturing plant inadequate in size; and the Committee have had under consideration extensions which should result in economizing the working expenses. After payment of interest and sinking fund charges, there is a balance of profit of about £1000. The most successful year on record has been experienced at Padiham. An increase of nearly 5 per cent. in consumption is credited principally to the prepayment meters. The accounts show a net profit of £1700. Practically 10 per cent. increase

in sales is reported from Smethwick, where a reduction in price to all classes of consumers took place at Midsummer, equal to over £3300. The net profit for the year, at £12,700, is £2000 more than for the previous twelve months, in spite of the big concession referred to. After deducting £4350 for public lighting, contributed by the department in aid of the district rate, a sum of £8350 is transferred to the credit of the extensions account. More gas was sold at Stourbridge, in spite of a temporarily reduced output due to the coal strike; and there is a net surplus on the working of £2900. The same remark as to consumption applies to Tipton, where the profit realized is by far the largest made by the gas undertaking. Last alphabetically, but not least, we have Wigan, where a steady increase in the output of gas has been taking place. There is a net profit of £7350, in addition to which the public lighting of the borough (costing £5500) is carried out free of charge.

## The Early Use of the Gas-Oven.

Some of the younger members of the gas profession, despite the references in "Newbigging's Handbook" and the historical record in "King's Treatise," will doubtless have learned with some surprise, from the letter of Mr. J. R. H. Jacobs, the Secretary of the Southampton Gas Company, published in last week's issue, that the history of cooking by gas goes back to the 'Thirties. Southampton deserves to stand foremost for the serious, though improperly requited, services in the cause of Mr. J. Sharpe, the then Superintendent of the Southampton Gas Company; and in future any compiler of the history of gas cooking must not fail to include the interesting testimonials (dated 1837) which Mr. Jacobs allowed to see the light of day through our columns last week. Looking back from the present standpoint furnished by nearly a 3½ million cooking-stove connection, it is noted how for something like half-a-century this branch of the gas industry's business lagged and languished; but no one in the industry prior to the 'Eighties encouraged disbelief that gas would in time become the chief cooking agent throughout the country. The third volume of "King's Treatise" was published in 1882—the year of the first Electric Lighting Act; and the chapter dealing with "Cooking and Heating" opened with the words: "The question of cooking and heating by gas, although destined probably to be one of great importance to gas manufacturers in the future, cannot be said to have had much influence in the past, unless indeed it be the very recent past."

## Pioneers and Others.

That is all quite true. The writer's cautious prediction has come to pass. The historical narrative that succeeded the opening words shows how men whose names are not well known to the younger generation of gas men worked to bring about what it was firmly believed would eventuate. Windsor contemplated in his patents cooking and heating by gas; every few years patents for new cooking and heating apparatus were introduced. Sharpe, Alfred King, and Ebenezer Goddard worked with goodwill to popularize their use; but their success was not great. The names of the inventors of the days preceding the dawn of the great popularity have been largely wiped out, and find no place in the firms of considerable importance and standing, with extensive works and employing much labour, who supply the needs of the gas industry to-day for heating and cooking apparatus. But we must not allow ourselves to push into the background the work of the pioneers; nor that of such men as William Sugg and Thomas Fletcher who, in their day, laid the broader foundations on which the present monumental use rests. The late Mr. Magnus Ohren used to claim that the old Crystal Palace (now the South Suburban) Gas Company were one of the first—if not the very first—to let cooking and heating stoves out on hire. In the days of prosperity, the names of the pioneers and early workers should not be forgotten. Cannot some of them be brought to mind, in one way or another, at the National Gas Exhibition? There ought to be some good exhibits, and space, to demonstrate pioneer work at the exhibition.

## The Weather and Gas Consumption.

Certain companies, the gas consumption figures of which have been confided to us, will again show some good increases for last half year, compared with the figures for the corresponding six months of 1912; and coming after the extraordinary increases of the preceding half year, this will make, for them, a remarkably good twelve months' gas business. We hope the reports that will be coming in shortly will disclose a universally excellent experience, though with higher coal prices, and a break in some quarters in the value of the principal residual, financial results may not be quite so healthy. However, we do not see any reason why the gas consumption should not have been generally on the high scale during the half year. The atmospherical experiences have been common. There have been only one or two comparatively short spells of hot weather; and dull weather, some of it cold, lasted well into April. Though we like the summer season to assume its rightful character, the present half year has started well for gas consumption—the temperatures for some days have been several degrees lower than those for the corresponding days of last year; and the days have not been bright. In London and the suburbs, domestic lighting has had, on several evenings, to be commenced before the ordinary hour for a July; and last Thursday, the darkness was so general in London that, during the daytime at intervals, most shops and offices had to resort to artificial lighting.

## Borrowing Powers.

There is perennially plenty of talk, but little action, over the subject of the growth of the local debt and the burdens imposed upon ratepayers generally; and, while hope may be entertained that something will be done to ameliorate the conditions, there is little use for expectancy obtaining any solid hold until some serious movement is made. In the House of Lords last Wednesday, the Earl of Dunmore successfully asked for a return to be made dealing with the subject of the borrowing powers of local authorities; and, among other points, the return is to include information showing the limitations placed upon the borrowing powers of local authorities. This second point is distinctly a more important subject now than the actual amount of the outstanding loans of local authorities. The latter are existent, and have to be dealt with, however onerous they may be, in the best possible manner. At the end of March last year, the loans to local authorities amounted to £536,000,000, and the valuation for poor rate was less than £216,000,000; so that the indebtedness of local authorities was two-and-a-half times the amount of the valuation. We hope there will be an annual budget of local expenditure; and above all that consideration will be given to the conditions under which local authorities are, in the present circumstances, able to secure large borrowings for trading undertakings without coming to Parliament (as statutory companies have to do) to have their position and powers reviewed.

## Ad Infinitum.

It seems ludicrous that local authorities should be able to obtain Acts from Parliament, giving them certain borrowing powers, with the right, without approaching Parliament for decades perhaps, to supplement their borrowings through the Local Government Board *ad infinitum*. The Local Government Board inquiry is not such a searching investigation as is customary in Parliament; and it really only concerns itself with the immediate purpose for which money is required without taking into account many surrounding questions. The parliamentary authorities who deal with Private Bills have long recognized this; and now and again they have treated the matter in a practical way. But their proceedings in connection with it are inconsistent, in that they do not uniformly apply limitation to the loans to be granted for definite purposes. In much the same way, now and again they have applied limitation to the amount of profits that may be transferred to the relief of the rates. But, in the majority of cases, the open door to excesses is allowed to remain, and inequality of local burdens is thereby assured.

## Coal Mines Nationalization.

With the *sang froid* that a labour member of the House of Commons would have called the attention of the national assembly to some small act on the part of a factory owner that was considered to be an infraction of something or other precious to the labour mind, Mr. Stephen Walsh, the member for Ince, last Wednesday, introduced to the House a Bill for the nationalization of all coal mines and minerals. Mr. Walsh is a man of broad views. The House likes him, though not his political principles; and he has won as much respect there as any of the labour members. He is a strong labour-socialist; and the Bill that he has fathered

represents one of the many dreams which has possessed the labour-socialist party for years. At labour congresses, and at meetings in the parks and at street corners, it has been a favourite subject for the demagogues. But never until now has the matter been written-down into a concrete scheme, and presented as a Bill for the consideration of Parliament. The transition, however, from the labour forum, the park platform, and the street corner tub, to the august presence of Parliament, has not made people look upon the project any the more seriously. It is the impossible that they see; though the labour-socialists do Parliament the honour of thinking that through it all mundane things are possible.

### The Scheme.

The Bill provides for the transfer of the coal mines on a day to be appointed; and also for the payment of compensation to *bonâ fide* investors in mines. But royalty owners are to have confiscated any rights that they consider they may have. The compensation to actual investors it is proposed to calculate on the actual output of the previous five years—a maximum of 10s. per ton being paid in the case of mines with an output of more than 100,000 tons a year, and of 12s. per ton in the case of mines of smaller production. The appointment of a Minister of Mines with Commissioners is arranged for; and labour is to control reins, whip, and everything. According to the scheme, there are to be three members representing the Mining Association, three the Miners' Federation, and three the Trades Union Congress. Therefore, labour aspires to a dominating force in this nationalization project. The Minister of Mines, who is apparently to be under the dominion of labour, is to carry on the business of coal vending, and, we suppose, under their direction, he is to fix prices. The mines are to be acquired by the formation of three per cent. stock; the interest to be payable out of the proceeds of the business. That is all. The House was tolerant. A first reading was given to the Bill. Presently, it will take its place among the *débris* of the session; and the wickedness of Parliament will supply topic for the next Labour Congress. The world will move on. Meantime industry may consider whether it would rather be under an order of things in respect of its fuel in which both owners and miners grow richer by putting the screw on the country, or be exposed to the tender mercies of a mines commission, two-thirds of which would be constituted of labour-socialists. We would rather things remain as they are, with some parliamentary control added.

### The Cost of Discontent.

If labour discontent is costly from the point of view of employers, it has also in most cases proved a very expensive luxury to those workpeople who may suffer from the infliction. Even victories gained may be too dearly bought. And if a rise in wages should be granted by employers—as the result of increasing demands for labour, a recognition of the growing cost of living, or a successful strike—is the rise invariably as beneficial as it should be to the men and their families? Those seeking an answer to the question, may find some material in a statement last week by one of the contractors for the huge waterworks scheme now being carried out for the Leeds Corporation. This statement was to the effect that wages paid had increased very considerably, but that unfortunately more than one-half of the increase had found its way to the canteen. This, however, is by the way; and it is to be trusted that it represents merely an isolated case. The object of the present note is to draw attention to some remarks contained in the fourteenth annual report of the General Federation of Trade Unions. In this it is stated that, for the third year in succession, the expenditure on federation benefit has exceeded the income from contributions. For the five years to March 31 last, the total income from contributions was £220,233, while the amount returned direct to the societies affiliated was £365,619. This is a state of matters which it is rightly felt "cannot be regarded with complacency." The reasons for the huge deficit of nearly £150,000 thus shown are given as: "Intellectual and economic unrest; the increased tendency towards general strikes and lock-outs; and the growth of what are termed agreements, but what are sometimes really movements on the part of indirectly affected workers to obtain strike pay as against out-of-work pay, which is usually lower, together with the partial recognition of the sympathetic strike." Several ways of meeting the situation are suggested; and it is satisfactory to reflect that they are naturally all of a character calculated to restrain precipitate and unnecessary strife. It is hinted that the Management Committee might be given power to intervene before notices were tendered; that they might rigidly refuse to grant benefits, except where definite and actual claims for wages or hours were involved; and the benefits might be reduced or the contribution increased.

### The Late Mr. J. Armitage Drake.

The funeral of the late Mr. J. Armitage Drake, which took place on Monday last week, was the largest seen in Halifax for many years; and on all sides there were signs of the great respect in which the deceased was held and of the sympathy felt for the family in their bereavement. The ceremony was attended by the Mayor (Mr. W. H. Ingham) and the Borough Justices, as well as by the Corporation Gas Engineer and Manager (Mr. W. B. M'Lusky) and a large number of his professional colleagues. The North of England Gas Managers' Association were represented by Mr. W. Ford and Mr. T. Bower; and the Council of the Society of British Gas Industries by Mr. W. D. Helps (Chairman), Mr. J. W. Broadhead (Vice-Chairman), Mr. Fred. West, and Mr. T. S. Clapham. Walking at the rear of the carriages were Mr. J. W. Wallace (General Manager of Drakes Limited), Messrs. E. L. Widdowson, H. K. Kindler, and A. Dobson (representatives), Mr. G. K. Dick (Chief Draughtsman), and Mr. C. W. James (Works Manager). Old employees of the firm bore the coffin.

### Important Appointment for Mr. John G. Tooms.

We learn that Mr. John G. Tooms, the Engineer and Manager of the Waterford Gas Company, has obtained the appointment of Engineer of the Primitiva Gas Company of Buenos Ayres, and that he will leave Ireland towards the end of August. The position was advertised in the "JOURNAL" for the 11th of March, under No. 5706, and there were a large number of applications for it. The successful candidate, who is about thirty-eight years of age, served his articles with his father (for many years engaged as an engineer with Messrs. Thomas Bower and Sons), and also under Mr. David Terrace, of Middlesbrough. He was engaged in various capacities in the gas undertakings at Harrogate, Widnes, and Keighley, and in 1898 entered the service of Mr. George Anderson. In 1900, when only twenty-five years old, he was appointed Engineer and Manager of the Waterford Gas Company, retaining his connection with Mr. Anderson until his retirement, when Mr. R. Bruce Anderson succeeded to his father's position. He rebuilt the whole of the Waterford Gas-Works, including the ferro-concrete gasholder-tanks, with direct labour; and under his management the sale of gas increased by 60 per cent. with a stationary population. Mr. Tooms was President of the Irish Association of Gas Managers in 1903; and in 1901 he read a paper on "Some Difficulties with a Gasholder." He is a member of the Institution of Gas Engineers, before which body he read a paper on "Gas Consumption Development of Small Undertakings" in 1907. He is a member of the Waterford County Borough Technical Committee and other local institutions. Since his residence in Waterford, Mr. Tooms has made a large circle of friends, whom he will leave with regret. He is an enthusiastic golfer; and was for some time Hon. Secretary of the Tramore Golf Club. At the gas-works he is esteemed by every member of the staff.

**The Will of Mr. Joseph Tysoe, M.Inst.C.E.,** late Engineer of the East Greenwich Gas-Works, who died last February, has been proved at £13,374.

**The Dorking Appointment.**—In the announcement of Mr. John Urquhart's appointment as Engineer and Manager of the Dorking Gas Company, in succession to Mr. Samuel Carpenter, which appeared in the "JOURNAL" for the 1st inst., it should have been mentioned that Mr. Urquhart will not take up his duties till the 15th of next month.

**The Alarm of the Coal Merchant.**—We continue to receive from householders copies of the circular distributed by the coal merchants, by which they seek to stem the tide of popularity of the gas-fire, by ridiculous and old-fashioned statements. We dealt with the circular in our editorial columns for June 17. It is to be regretted that several gas companies in and about London, whose areas have been flooded with these circulars, have taken no steps to send out a rebutting one, putting householders in possession of the truth of the matter. In one area alone, certain householders have received at least half-a-dozen copies of the circular from different coal merchants. Perhaps the inactivity of the gas companies in the matter is due to the belief that gas heating has obtained such a position now that experience among householders cannot be deposed by such absurdity as has emanated from the coal merchants. At the same time, there are householders—potential customers for gaseous heating—who would like to have the other side of the question presented to them. For this purpose, a neat leaflet, containing facts and medical testimony, has been prepared and printed by the British Commercial Gas Association, of 47, Victoria Street, S.W.

## PERSONAL.

The marriage is announced, as having taken place last Wednesday, of Miss MADGE STEWART, younger daughter of Mr. James Stewart (the Editor of the "Gas World"), of Leyland Road, Lee. The bridegroom was Mr. EDWARD A. CATCHPOLE, of Grove Park, S.E.

Mr. ALEX. MACKIE, who has for some years been in the employ of the Alva (N.B.) Town Council, has been appointed to succeed Mr. R. B. Chalmers as Gas Manager, when the latter leaves to take up his new position at North Berwick. Mr. Mackie has not only a good knowledge of the requirements of the people of Alva, but has qualified himself, by examinations and otherwise, to fill the position.

Mr. J. L. WILKINSON, who has held the position of Secretary to the Portsmouth Water Company for the past sixteen years, has retired owing to ill-health; and in consideration of his long services with the Company, extending over some forty years, the Directors have granted him a pension for life. Mr. R. BISHOP, the Accountant to the Company, has been appointed to the vacancy; and Mr. HERBERT ASHLEY, M.Inst.C.E., will in future be the Engineer and General Manager. Mr. Ashley has been Engineer of the Company since September, 1902, at which date he left the service of the East London Water Company, with whom he had been engaged for nine years as an Assistant-Engineer.

## OBITUARY.

We regret to record the death last Thursday, as the result of a cycle accident, of Mr. W. JARRETT DOUGALL, who for eighteen years was Manager of the Sevenoaks Gas-Works. About seven weeks ago, while he was cycling, on a very hot day, in brilliant sunshine, which it is supposed affected his eyes, he dashed into a trap which had been drawn up in the shade, and received shocking internal injuries. An operation was performed, which he bore very well; and it was hoped that, having an excellent constitution, he would eventually recover. But complications set in, with a fatal result. He was only forty-three. At the inquest on Saturday, a verdict of "Accidental death" was returned.

The death occurred early last Friday morning of Mr. SAMUEL JOSHUA COOPER, of Mount Vernon, Barnsley, one of the oldest and most respected members of the community. Mr. Cooper, who was eighty-two years of age, was a Director of the Barnsley Gas Company until his retirement some years ago. Though never taking an active part in the management of public affairs, he was noted for his generosity to the poor of the town. He was greatly interested in hospital and nursing work, and provided a nurses' home in connection with the Barnsley Beckett Hospital. He founded a fund for the maintenance of a nurse for the poor in Worsborough Dale.

## ELECTRICITY SUPPLY MEMORANDA.

WHEN a tale is put into circulation, it generally expands in its details as it passes from mouth to mouth. We have been interested, not to say highly amused, over a paragraph that has appeared in the "Melbourne Age" drawing a wonderful picture of what is happening in London in the matter of electric cooking. The paragraph is quite a revelation to us; and it would be more so to the owners of "most of the large London restaurants," who, unknown to themselves, "are having electric cooking apparatus installed. It seems that it is a Mr. J. H. Moorhead who has carried to Melbourne this remarkable piece of intelligence (of which London is totally ignorant). It is further stated that the borough of Marylebone has done extraordinarily well in this line. Among other things, it has increased its "profits" by £3000 in one year by the introduction of electric cookery, and this year is expecting a further increase of £7000 from the same source. This intelligence about the "profits" is a little puzzling, as the gross revenue in the financial year just closed totalled to £118,334. Of this, interest and sinking fund absorbed £114,330, so that the net profit for the year was £4004. Where is the £7000 "increase of profits" shown? In the working statements, 6321 items under the heading of "heating and cooking, and other uses," do not by any means represent individually big applications. Analyzing the figure, there are only 620 cooking equipments; and we fancy that down to an electric egg-boiler would be classed as a "cooking equipment." Melbourne must not be deceived by exaggerated talk or pompous description. We know our electrical men; Melbourne does not.

**As Pictured in Melbourne.**

As to "most" of the large leading restaurants having electric apparatus installed, that is untrue. We can count on our fingers the London restaurants that have had electrical cooking apparatus installed, and over which there has been any talk; we cannot count up on our fingers the restaurants existing in London. It is rather interesting to look at the history of the electrical equipment of these restaurants. There was a restaurant electrically run at the last Smoke Abatement Exhibition at the Agricultural Hall. Mr. A. H. Seabrook, the Engineer of the Marylebone Electricity Department, was on the Committee that organized the electrical section of the exhibition; the London Delicacies Association ran the electrical equipment. At the Shakespearian Exhibition at Earl's Court last year [see "JOURNAL," Sept. 3 and Sept. 17, 1912], there was a restaurant; it was run by the experts of the Home Delicacies Association. There is the "Delico" Restaurant, in James Street, W. That was (so it was announced in the electrical press) equipped by the Marylebone Electricity Department, and was (we suppose it is now) being run by the Home Delicacies Association [see "JOURNAL," Aug. 13 last]. Messrs. Debenham and Freebody's electrically equipped kitchen, supplied by the Marylebone Electricity Department, was (the last time we heard anything about it) being run under contract with the Home Delicacies Association. Mr. Debenham was (he may be now) Chairman or an ordinary member of the Marylebone Borough Council Electricity Department. Then we know of the "Tricity" restaurant carried on in the commercial interests of the "Tricity" electric-cooker; there is also the electric restaurant in the Earl's Court Road, run in the interests of the Brompton and Kensington Electricity Supply Company [see "JOURNAL," May 13 last]. There is, we believe, a restaurant in the City which has had some electrical apparatus incorporated. We rather fancy the City of London Electric Supply Company were interested in this equipment. But everywhere there appears to be intercommunication in some way between these restaurants and the electricity suppliers; and the expert rules in the supervision of the equipments. The officers of the Marylebone Electricity Department agree that it is necessary to have frequent expert inspection of electric cooking apparatus; and the department practises what its officials preach in this regard. Had we read in a comic paper that "most of the large London restaurants are having electric cooking apparatus installed," we should certainly have smiled; to read the statement in the "Melbourne Age" makes us laugh outright. The Battersea Borough Council, in the interests of their Electricity Department, sought to compel the residents on the Latchmere and Town Hall Estates to use electricity for cooking purposes. The residents petitioned for gas-cooking stoves on account of the unreliability and expense of electric-cookers [*ante*, p. 62]. They got what they wanted. Enough said.

**Restaurants and Electric Cooking.**

There are strange things done in the cause of electrical economy. Electrical engineers know that the proper order of the principles of installation should be safety first and economy second; and some of them have an anomalous way of putting these principles into practice. In various electrical installations we have observed that the wiring is carried in steel tubing on the lower floors, and in wood casing on the upper floors and in the roof—just the most vulnerable part from the fire-raising point of view. Many fires, the cause of which has been stated as "unknown," have started in the roofs of electric-lighted premises; and it has been surmised that defective flues that have stood with character unblemished for many decades, or sparks from a chimney, have been the cause of the conflagration. The writer was once concerned in a fire that started at the ceiling-rose of an electric light pendant; and, on access being obtained to the roof, it was found that the flame was being carried all along the wires run on members of the dry timber constructed roof. A correspondent of the "Electrical Review" has called attention to a contract executed in the suburbs of London, under the supervision of consulting engineers, in the following manner: Steel tubing from switch-boxes, sunk into the walls, and carried up into the roofs; there wood casing is used; and, in order to save cable, three-plate ceiling-roses are fixed to the casing, and used as connectors. The correspondent asks, Can one wonder at fires occurring as long as this is allowed? The same thing, he adds, applies to work done in subways on this job. The tube is not bonded. The fire at a private residence at Chislehurst on June 29, which caused damage to the extent of £10,000 to £12,000, was "so far as can be ascertained, caused by the fusing of electric wires *over* one of the upper rooms." Another correspondent of our contemporary complains of a fire insurance company. He has just completed a country house job. The voltage is only 25. The fire insurance company, however, require the wires to be put into steel conduit; and moreover the conduit must be kept 2 inches clear of all woodwork. We do not blame the fire insurance company. Considering that conduit is "universally run on wooden joists," the correspondent looks on the requirement of the company as sheer wantonness. More is the pity that the running of conduit on combustible material is the "universal" custom. The correspondent in question does not have to pay out the claims made for fire destruction. The electrical companies do; and they have been hard hit by electricity.

**In the Roof.**

Bearing upon this subject, Mr. G. Scott Ram, the Chief Electrical Inspector of Factories, in his annual report, refers to the disastrous fires that have occurred within recent times at electrical generating-stations, and which caused so much inconvenience to those who had put their faith in electricity for lighting or power. As Mr. Scott Ram remarks,

**Inflammable Insulation and Woodwork.**

these fires afford object-lessons of very great importance (though costly) to those in charge of, or who are responsible for, the equipment of electrical stations. In three recent cases, it was the covering of the cables that burned and spread the fire; and although some of the cables were in so-called "fireproof" composition tubes, these appear to have been of little, if any, use in checking the spread of the fire. That where the cables are in a covered trench, or under a ceiling or roof, they are most readily attacked has been further clearly demonstrated in the case of a fourth station fire which has occurred since the period covered by the report. In this case the cables were in a subway some 6 ft. or 7 ft. in height, and were laid on insulators on racks on each side of the gangway. All the cables within about 2 ft. of the roof of the subway had their insulation completely burned off, but those nearer the ground were practically undamaged. In many of the older stations, the cables and wires behind the switchboards and in cable trenches and subways are hopelessly mixed up, so that, should a fire be started at any point, it would be impossible to prevent it from rapidly spreading and involving the whole. So long as cables with inflammable insulation are used in electrical stations, it is obvious that some safer system of isolating and protecting them is necessary if the possibility of such disasters is to be prevented. The small wires for instruments regulating resistances, &c., are often a source of danger, being poorly insulated and looped about anyhow at the backs of switchboards. It is generally recognized that inflammable woodwork, particularly soft wood, should not enter into the construction of switchboards, yet Mr. Scott Ram lately found a new high-tension three-phase switchboard in a public supply generating station practically enclosed in woodwork; the bus bars were just below a matchboard ceiling, and the whole passage-way at the back of the open-fronted cells was enclosed by deal boarding. If such things are allowed by electrical engineers in their own stations, it becomes a question whether they are fit and proper persons to supervise electrical installations on private premises.

**Fatalities.**

The report of Mr. Scott Ram only extends to factories and workshops; but it is shown that, within his purview, there were during the year nineteen deaths from electrical causes. Four were at electrical stations, and fifteen in factories where electricity is used. To portable apparatus, connectors, and flexible wires are traceable the greater number of accidents in factories. Of the nineteen cases of death, no less than eight were at voltages not higher than 250. One was at a voltage of 200, one at 220, four at 230, and two at 250. Two of the cases are especially noteworthy. A man, aged 42 years, was using an improperly constructed and non-earthed hand lamp. It was connected to a 230-volt supply. He was found dead on a wet floor. The second case was that of a man who died from a shock received through walking over electrically charged ground.

**The Cost and the Charge.**

It is sincerely hoped that what took place at a recent meeting of the Hastings Town Council may be taken to mean that a majority of the members are having their eyes opened to the absurdity of the widely varying charges for electrical energy in a town like Hastings. In the first place, a question was asked as to what was the cost per unit, *including all charges*, for the year 1912-13, calculated upon the current sold. The reply was 0·98d. We should like to know whether it is truly the case that the 0·98d. includes all charges, because, in the "Electrical Times" tables, these per unit figures are published: Hastings (1913)—Coal and other fuel, 0·86d.; oil, waste, water, and stores, 0·07d.; wages of workmen, 0·22d.; repairs and maintenance, 0·42d.; rent, rates, and taxes, 0·13d.; management, salaries, office and legal expenses, insurance, &c., 0·46d.—total working costs, 2·16d. Nothing there for sinking fund, interest, depreciation, and renewals! The 0·98d. calls for some explanation. After this information was given, there came a recommendation from the Lighting Committee that the present charge of 1½d. per unit for supply for heating and cooking purposes should be reduced to 1d. per unit, and that meter-rents should be curtailed by one-half. The figures in the "Electrical Times" do not justify the recommendation. According to the report in the local "Observer" as to what transpired at the meeting, the Deputy-Mayor (Mr. Clement Hill) made some rather curious statements in support of the proposal. One of his reported assertions was that "there had been a considerable surplus of profits." The Deputy-Mayor was either unduly excited, and did not weigh the meaning of the words he used, or he had been examining the profits by the aid of a strong magnifying glass. Then another statement he made, in support of the recommendation, was that "big consumers got current at less than cost price." What a confession! Why should they get current at less than cost price? Who has bungled the management of the concern in such a way that this should have happened? And who bears the burden of the difference between the price paid by these large consumers and cost, *plus* the capital charges? There is only one answer—the aggregate of consumers who pay 6½d. per unit. That "less than cost price" was a bad tactical disclosure. An amendment referring the recommendations back to the Electricity Committee was carried by a substantial majority. It is to be hoped the majority will see to it that they are not in future hocussed over this matter of prices; for some of the councillors have in the past shown, through this matter of charges, that they have a remarkable proportion of gullibility in their natures. One of the richest pieces of imposture is the capacity of the Electricity Department to supply a public metallic filament lamp at 2d. per unit, while a public arc lamp must be charged at a higher rate per unit. A private consumer using a number of metallic filament lamps must pay still more per unit than the additional lamp-post connected up, and surmounted by one metallic filament lamp.

**Spurious Lamp Duties.**

The kindly soul, connected apparently with the Brighton Corporation Electricity Department, who sent "Memorandist" some meagre information regarding the assisted wiring scheme at Brighton has favoured him with another anonymous postcard. The propensity of electricians for hiding themselves in dark corners when there is a question of controversy before them is notorious. The anonymous correspondent has caught the writer tripping over one small point. The slip was in the sentence, in the "assisted wiring" paragraph in the "Memoranda" for July 1, in which our unknown correspondent was asked to tell us whose lamps they are with which the Corporation Electricity Department is able to guarantee 1-candle power per watt-hour. The context shows that the words should have been "1-candle power per 1·25 watt-hours." We have before us a large number of results of tests of metallic filament lamps that show an average of upwards of 1·5 watt-hours per candle. We know, too, the great variability that the National Physical Laboratory has found in the performances of metallic filament lamps of different and the same batches; and instances of what some other people—and those other people electricians—have discovered by experiment will be seen in the "Memoranda" for Jan. 28 and Feb. 11. In the former, it will be observed Mr. A. J. Makower says that the usual efficiency for the metallic filament lamps at present on the market is between 1·4 and 1·6 watts per British candle power. He adds that "it cannot be held to be justifiable to supply a lamp giving 11-candle power to a customer who expects to get a 16-candle lamp." Are these spuriously rated lamps representatives of the so-called 16-candle power ones that will run for fifty hours for a unit of electricity under the Brighton assisted wiring scheme? We repeat our question of July 1 in the amended form.

**Rating of Metal Filament Lamps.**

The Council of the Incorporated Municipal Electrical Association have developed a most cautious policy. In their annual report (as seen last week) they announce decisions without giving reasons. Another case in point affects the rating of metallic filament lamps. Through their representatives on the Lamp Standards Committee, they some time ago expressed the view that metallic filament lamps should be marked with both candle power and wattage. But they have now changed their coats. They find there is a disposition on the part of makers and central station engineers in favour of rating in watts instead of candle power; and now the Council assert that they, too, have reason to modify their previous view, and to express themselves in favour of rating in watts only. Why this change of opinion? Why a change from something that the public could appreciate, and to which they have grown accustomed, to something which they will be unable to appreciate, and which will convey no meaning to them. When they formerly asked for a 32 or 50 candle power lamp, users at least knew what they wanted, if they did not always get it. But if the rating is in wattage only, and the user requires something that is approximately a 50-candle power lamp, he will have to ask for a 65-watt lamp. Are the electrical people thinking that the users will be inveigled into thinking that the watt represents a candle? Or is it that the electrical people are ashamed of the revelations that have been made as to the lamp markings in so many cases representing arbitrary, and not actual, values, and therefore pieces of gross deception on the public? There must be something that the electrical people are anxious to hide in favouring the change.

## NOTES FROM WESTMINSTER.

One or two matters possessing interest came before Parliamentary Committees last week. The points raised can be briefly indicated.

**Middlesbrough and the Out-District Gas Supply.**

After the decision of the Court of Referees to allow the North Ormesby and the South Bank and Normanby Gas Companies *locus* in respect of the Middlesbrough Corporation Extension Order Confirmation Bill, there was little lapse of time before the measure was introduced to the notice of the members of Colonel Bathurst's Committee. The Bill is producing a spacious fight; but we are only concerned with the situation of the two Gas Companies. The position, as we stated last week, is simply this: The Corporation have powers of supply in the areas of the two Companies; but they have never exercised them. Before they could do so, they have, under present conditions, to obtain the sanction of the Ormesby District Council to the laying of mains. If the extension is allowed, the protection that this gives to the Companies will (as things are at the moment) be taken away;

and it will only be necessary for the Corporation to grant themselves permission to lay the necessary mains. By the opening speech of Mr. Balfour Browne, K.C., for Middlesbrough, it is, however, clear that the Corporation are prepared to leave things as they are, and they have inserted a clause to this effect. But they do not want their present position disturbed, as, if their supply rights in the areas in question were taken from them, and the Companies were given absolute rights, it would place the latter in a position superior to that now occupied by them in the event of the Corporation purchasing their property, as they are likely to be compelled to do if the borough is extended, in order to suppress the anomaly of widely varying prices for gas as between the borough and the outlying areas. Mr. Balfour Browne holds that the Companies are only fighting for absolute monopoly, so as to get a better price in the event of purchase. Middlesbrough seems pacifically inclined. One witness went the length of declaring that he sees no reason why in some way the protection given by the veto as to laying pipes in Ormesby should not be continued, so long as it does not enhance the value of the Companies' concerns. It is clear, if the extension of the borough is allowed, that sooner or later the two Companies will be absorbed. It is an interesting position; and there is some natural curiosity as to what will be the upshot of the present proceedings.

**Dublin Gas Company and Electricity Supply.**

The Alliance and Dublin Consumers' Gas Company were before Lord Newton's Committee last week in opposition to the Dublin Southern District Electric Supply Company's Order Confirmation Bill, which is to empower the supply of electricity in Kingstown. There was an attempt to deprive the Gas Company of a hearing; but the Committee considered that the Company had good grounds for appearing—in fact, this is one of those cases in which there is as much that is subterranean as on the surface. The Gas Company believe that they have a right to become electricity suppliers, in view of the fact that their Act of 1866 states that the Company were incorporated for "supplying gas or other improved means of lighting." But the Board of Trade do not place much value on the words, framed in 1866, as applying to electricity; and they have before held the view that the Gas Company must proceed by Provisional Order if they want electricity powers. The Company had an electricity scheme in hand, which they were proposing to introduce to Parliament, for Blackrock, Kingstown, and Dalkey; but it is questionable whether they will go on with it now that they have lost Kingstown through the passing of the present Order. The fact that the Company were prepared to undertake the supply of electricity to the three areas was one ground of opposition to the Dublin Southern Company's Order; and the other was unfair competition. If Mr. Francis Cotton is right that the Dublin United Tramways Company are really at the back of the present promoters, then the Gas Company have good ground for complaint, inasmuch as they have been successful hitherto in restraining the Tramways Company from supplying electricity excepting for their own purposes. If, too, surmise has foundation, the new Company is really only an offshoot of the Tramways Company; and through it the Tramways Company will virtually become lighting competitors. It will not therefore be surprising to see power sought in the near future for a bulk supply from the older to the newer Company. Though Blackrock and Dalkey considered that the three districts would be better served by the Gas Company, and that there would be greater economy resulting from the joint scheme under their established conditions, the Committee allowed the Electricity Company's Order to go through.

**A Question of Agreements.**

There was a big and involved discussion before Lord Ribblesdale's Committee last Wednesday and Thursday over the Pontypridd and Rhondda Joint Water Board Bill. But the whole matter is simply one of local importance, and can be stated in comparatively few words. The Merthyr Tydfil Corporation are well placed in regard to water supply; and they have a goodly surplus that they can dispose of to less fortunate authorities, and so save them capital expenditure in obtaining supplies on their own account. The Pontypridd Board, in their Bill asked for authorization to enter into an agreement for a bulk supply from Merthyr, and to construct on their own account additional works. The agreement provides that the Merthyr Council are to deliver to the Board in perpetuity a minimum of 1 million gallons of water per day at 3d. per 1000 gallons—giving the Corporation a revenue of £4500 a year. This quantity is to be paid for whether or not it is taken; but, of course, it is not to be paid for if the Corporation are not in a position to supply. The maximum the Board are to take is an extra 2 million gallons. The Aberdare Corporation wanted to intervene, on the plea that they had a large constituency to supply, and might want water from Merthyr. But the Committee declined to indulge them. Then there was the Barry District Council. They did not want to lose a statutory right, gained in 1911, to obtain from 2 to 4 million gallons a day from Merthyr. But they have to get legislative sanction to the construction of the necessary mains. The ratepayers, in connection with a Bill promoted by the District Council this session, vetoed the provisions that would have conferred the powers. The preferential position that the Barry Council obtained is something that they can ill-afford to lose; and so they intervened on the Pontypridd Bill, to get their position assured notwithstanding the action of the ratepayers. The Committee were not prepared to let the surplus water stand in reserve, waiting the convenience of Barry, and yet they desired to protect them. The result was that a clause was put into the Bill providing that, if the agreement be cancelled or cease to have effect, nothing in the Pontypridd measure should prevent the Corporation from supplying the Barry or any other local authority, body, company, or person, with the quantity of water mentioned in the agreement.

# DUTCH ASSOCIATION OF GAS ENGINEERS.

## Forty-First Annual General Meeting at Rotterdam, July 9 and 10.

### A REVIEW OF THE PROCEEDINGS.

[By Our Own Representative.]

The Forty-First Annual General Meeting of this Association was held last week in Rotterdam, under the presidency of de Heer P. Bolsius, of Bois-le-Duc. The city itself is highly interesting, and is typically Dutch, with its old paved streets and canals. The meetings were held in the Doelen—the premises of a large club called "Harmonie." The spacious reception room and dining hall, as well as the other apartments which were at the disposal of the Association, were most convenient for the purpose, and contributed greatly to the success of the meeting and the comfort of the large gathering of members and visitors.

#### The Inaugural Reception.

The members and guests assembled at 8.15 on Tuesday evening, July 8, in the reception hall of the Doelen; the numbers being quite up to those of previous years. After numerous and effusive greetings, as are customary on these occasions, silence was called for a speech by de Heer Knottnerus, who, in eloquent terms, welcomed the Association on behalf of the Netherland-Indies Gas Company, which was also represented on the platform by several other Directors. He thanked the Burgemeester for having honoured them with his presence on this occasion, and concluded by wishing success to the meeting. De Heer Bolsius, the retiring President, thanked the Netherland-Indies Company and de Heer Knottnerus for their kind reception of the Association. He spoke of the great and continued progress of the gas industry, which, in Holland at any rate, ranked as one of the great national industries. It had done much in the interests of science, and the past century might almost be called the gas century. Most noteworthy of all was the contribution of gas towards the amelioration of the conditions of social life.

Quite a feature of the proceedings was the serving of refreshments by nigger waiters—very appropriate to the occasion of the reception by the Netherland-Indies Gas Company. Their appearance in white suits and coloured turbans was most picturesque. Heavy rain, falling the whole of the evening, prevented the use of the garden of the Doelen, which looked very pretty with gas illuminations among the trees. This was unfortunate, as a military band rendered selections of music which were scarcely audible from the reception hall. In spite of this, however, every one seemed quite happy, and groups of members discussed the events of the year long and eagerly.

#### Opening of the Meeting.

The more serious business of the meeting commenced on Wednesday morning. The members began to assemble soon after nine o'clock, and shortly afterwards they gathered in one of the halls of the Doelen. The first item was the Presidential Address of de Heer Bolsius, who, after greeting the assembly, gave a clear survey of the events of the past year. He spoke of the forty years through which the Association had passed, and of the progress made in all directions. After mentioning various events of interest, such as the Antwerp Exhibition, he made special reference to the recent jubilee celebrations of the Institution of Gas Engineers. The respects of the Association were then paid to those who had been removed by death in the course of the year,

among whom special reference was made to de Heer Taalman Kip, a former member of the Committee.

The next speaker was de Heer Buettgus, the representative of the Dutch Water Association, and he spoke on the question which is under consideration of uniting the Gas and Water Associations. In future, "Het Gas" is to serve as the official organ of both. De Heer Bolsius next made the formal proposal that Sir Corbet Woodall be elected an honorary member of the Association; and the motion was carried with acclamation. The minutes of the fortieth meeting, held last July in Arnheim, were then passed. The Hon. Secretary, de Heer Doesburgh, then read out the list of the guests present, and offered them welcome in the name of the Committee. The Treasurer, de Heer Bakhius, gave a short summary of his report for the year, which was confirmed by the various members of the Audit Committee, and passed. Then followed a proposal from the Committee to increase the annual subscription of the ordinary members of the Association from 10 to 15 gulden. This evoked some discussion and met with much opposition on various grounds, but was eventually carried. Another motion from the Committee followed, suggesting the appointment of a salaried secretary to attend to the constantly increasing business of the Association. This, too, met with opposition, but was passed after explanations by the Committee.

De Heer Knottnerus followed, and in glowing terms sang the praises of de Heer C. T. Salomons, the untiring Editor of "Het Gas," and Assistant-Engineer of the Rotterdam Corporation gas undertaking. Thanking him for his innumerable services to the Association, the speaker, in the name of all present, wished that he might be spared many years to continue his good work. De Heer Salomons replied in a few well-chosen words. Short reference was then made to the Commissions' reports, which had already been published in "Het Gas." The question was raised of the desirability of founding a central laboratory for the general good of the industry; and this was referred without discussion to the Committee. The announcement that de Heer van Doesburgh had very kindly consented once more to take over the arduous duties of Honorary Secretary was greeted with warm applause. The morning's proceedings concluded with a description, illustrated with lantern slides, by de Heer Sissingh, the Chief Engineer and Manager of the Rotterdam Corporation gas undertaking, of the new Keilehaven Gas-Works, which were erected under his supervision.

During lunch, which was served informally in the dining hall of the Doelen, a ballot was taken for the election of officers for the coming year. During the afternoon, it was announced that de Heer Blom, of Haarlem, had been chosen as the new President, and de Heer de Breuk, of Dordrecht, as Hon. Treasurer. This concluded the business portion of the programme, and the main part of the afternoon was devoted to technical matters.

### Technical Proceedings.

Mention has been made of the description by de Heer Sissingh of the new gas-works, to which further reference will be found below. There were two other papers read. One was by de Heer Diephuis, of Amsterdam, on an explosion method of clearing stoppages in service pipes. A few questions of no great importance were addressed to the author of the paper, and then followed a description by Herr Alberts, of Berlin, of some of the results obtained with high and low pressure gas, by the firm of Ehrich and Graetz, with a comparison of the general costs of the two systems. One or two questions were asked, and some of the figures of Herr Alberts were somewhat adversely criticized by Mr. Jacques Abady, of London.

This ended the papers proper; the rest of the technical work being comprised of questions, which were introduced by various members for discussion. De Heer Koppejan, of Amsterdam, asked why centrifugal exhausters are not more in use, maintaining that they have many advantages, such as low cost and economy of space. The question of gas-motors and electromotors for use in gas-works called forth much discussion; the general opinion being that, though no hard-and-fast rule can be laid down as to which has more advantages, gas-works should use gas-engines as much as possible.

Thursday morning opened with a discussion of the merits of central producers, especially for gas-works of medium size; the subject being introduced by a short dissertation by de Heer van Doesburgh. This evoked some interesting remarks by Herr Koppers, of Essen, on the subject of higher temperatures for coal carbonization, their relation to retort materials, and also on the use of cheaper fuels in the producer. A brief discussion on lime purification for small gas-works followed. The question of the absence of spiral-guided gasholders in Holland was on the paper; but no speakers were forthcoming on the subject. A question followed as to whether the Simmance-Abady instruments are in use in Holland, and whether they are found to be reliable. A description of some of the instruments was given by Mr. Abady himself, and by Dr. Koopman, one of the Continental representatives of the firm. Herr Lux, of Ludwigshafen, added some remarks of warm praise for the instruments, and the President congratulated the inventors on the excellent results of their work.

An announcement was made by the Hon. Secretary, de Heer van Doesburgh, of the forthcoming Gas Exhibition in London, and of an official visit, arranged for October, by the Dutch Association, on the invitation of the Exhibition Committee. The President then declared that Flushing had been chosen as the place for next year's meeting, on the invitation of de Heer van Niftrick, the Manager of the Imperial Continental Gas Association works in that town. A hearty vote of thanks was passed to the President, de Heer Bolsius, on the proposition of Dr. Weurdenburg, of Utrecht, for the capable manner in which he had conducted the meeting. With this, the business of the meeting concluded.

### Social Functions.

The social part of the programme included informal luncheons on both days at the Doelen. On Wednesday, after the adjournment, dinner was taken at the Zoological Gardens. No speeches were made; but the President read a telegram that had been received from Sir Corbet Woodall, thanking the Association for electing him an honorary member, and offering his best wishes. On Thursday afternoon, a steamer trip was taken round the harbour, with a call on the way to inspect the new gas-works at Keilehaven, a short description of which is given below. The harbour was exceedingly interesting, and the guests were informed that, from point of view of size, it is second only to Hamburg on the Continent. The trip was, however, largely spoiled by a thunderstorm and very heavy rain, which started during the inspection of the works, and lasted some time.

In the evening the official banquet of the Association was held in one of the halls of the Doelen, with the retiring President, de Heer Bolsius in the chair; and the fortieth anniversary of the Association was celebrated. The first toast was the loyal toast of the House of Orange, which was honoured with the singing of the original song of the House. During the dinner, the national anthems of most of the European countries were honoured by the members. De Heer Bolsius then proposed the toast of the Netherland-Indies Gas Company, which had just completed its fifty-years jubilee, coupling with it the name of de Heer Knottnerus. The latter replied with an excellent speech, in which he sang the praises of Rotterdam—the largest town in Holland. De Heer van de Hoeve, a member of the Municipal Gas Committee, made a witty reply on behalf of Rotterdam. The success of the gas undertaking he attributed largely to the capable management of de Heer Sissingh, the Chief Engineer. He finally declared how much was owed in general to the gas industry, which provided so well for many important needs of civilization. Other toasts included de Heer Bolsius, the President of the Association; de Heer Knottnerus, the Vice-President; de Heer Sissingh; and his staff. De Heer Sissingh made an eloquent reply, and the toast list concluded with a speech by Mr. Jacques Abady, of London, who expressed the good wishes of the English gas industry, in all its branches, and spoke of the many ties which unite Englishmen and Dutchmen. At the conclusion of the dinner, the members adjourned to the garden of the Doelen, where, in perfect weather, selections of music were rendered by a military band.

### Visit to the Keilehaven Gas-Works.

The new works of the Rotterdam Corporation, known as the Keilehaven works, have been recently erected under the supervision of de Heer C. Sissingh, the Chief Engineer to the Corporation Gas Department, and parties were conducted round them by members of the staff, including the Chief Assistant Engineer, de Heer Hendricks. The gas-works possess a novel feature in that the carbonizing plant consists only of chamber ovens and water-gas plant, and, while the latter is a very fine installation of Humphreys and Glasgow's well-known plant, the former calls for some comment. The works have an extensive riverside frontage and are built on the site of a marsh, so that considerable piling and foundation works were necessary before the erection of the plant proper was proceeded with. The coal is unloaded from barges by a grab elevator, by which it is raised and shot into an elevated stationary hopper. A complete telpher system is fed from this hopper, and the coal can either be conveyed direct to the chamber ovens, or dumped upon storage heaps. The coal is stored in the open—though the whole of the manufacturing plant is housed in neat buildings after the Continental fashion.

The chamber ovens consist of ten sets each of four ovens—19 ft. 7 in. long, 1 ft. 4 in. wide, 7 ft. 2 in. high. Charges of 24 hours are employed, each charge containing 4¼ metric tons. The coke is discharged from the chambers upon fixed inclined shoots, whence it falls by gravity into a large iron truck, which is picked up by a light loco. and pushed on to an iron platform. The platform is the movable base of a concrete structure, standing directly over a water tank, and containing mechanism by which the truck, with the unquenched coke, is lowered into the water tank. The steam escapes up the concrete shaft, which is 137 feet high, and the truck is then elevated through the shaft to the breakers. The coke is emptied automatically, and can be conveyed mechanically to the coke store, the water-gas plant, or else discharged through hoppers direct to carts or trucks. The make consists of 75 per cent. of coal gas and 25 per cent. of water gas. Only one gasholder is employed; and in order to obtain effective mixing, a gas pump situated in the meter house is employed to draw the gas from the inlet to outlet of the holder, during a certain portion of the day. It was stated that by this means a constant quality of mixture is maintained without any difficulty. The gas pump, which has a capacity of 10,000 cubic metres (353,000 cubic feet) per hour, is also employed to boost the gas under a pressure of about 15 inches to one of the outlying districts, by means of a 30-inch main 7 kilometres long.

The meter house contains two multiplex meters (Cie. pour la Fabrication des Compteurs à Gaz), each having a capacity of

100,000 cubic metres (3,532,000 cubic feet) of gas per day. One is used for coal gas and the other for water gas, and the meters are remarkably small for their capacity. A third and smaller meter for the works' consumption is also fixed. A noticeable feature of the meter house is that it contains a basement, in which are run all the meter and governor pipes and connections. They are thus absolutely accessible—a feature which will appeal to all engineers.

The purifier house contains four large elevated purifiers with an oxide store below. Bog ore and "Lux" purifying material are employed as a mixture. Three boxes are used at a time. They are luteless with rubber joints, and here again absolute accessibility is the keynote.

Undoubtedly the chief feature of the works is the chamber carbonizing plant. The whole scheme reflects the greatest credit upon de Heer Sissingh, the Chief Engineer, and his assistants; and any engineer who is interested in the problem of making gas without creating the slightest nuisance is recommended to inspect what are truly model gas-works.

## REFRACTORY MATERIAL IN GAS-WORKS.

By Thomas Holgate, F.C.S., M.Inst.C.E.

(*Concluded from p.* 104.)

If we adopt "kaolinite" as the ideal clay, and then examine the substances associated with it in Nature (as in China clay), we shall find these latter to be fairly numerous; but then we shall, by making such choice as this, have excluded from our purview many of the substances that we know to exist in fireclays, and we shall be arguing from a basis that approximates more to the ideal than to the actual of the refractory materials. On the other hand, if we take any single specimen of a clay such as is used in making refractory materials, and make this our standard of reference, we are limiting our range of view as to what may possibly be present in other clays of differing geological periods. Yet this information is of distinct value; and therefore an analysis by Mr. W. F. Hillebrand of clay from Charleston, South Carolina (column No. 1), and one by Mr. R. B. Biggs of a residual clay from limestone, Staunton, Virginia, are given below:

| Name of Component and its Formula. | No. 1. Clay from Charleston. Percentage. | No. 2. Clay from Staunton. Percentage. |
|---|---|---|
| Silica . . . . . $SiO_2$ | 50·12 | 55·90 |
| Alumina . . . . . $Al_2O_3$ | 18·04 | 19·92 |
| Ferric oxide . . . . . $Fe_2O_3$ | 5·91 | 7·30 |
| Ferrous oxide . . . . . FeO | .. | 0·39 |
| Calcium oxide . . . . . CaO | 6·14 | 0·50 |
| Magnesium oxide . . . . MgO | 0·48 | 1·18 |
| Sodium oxide . . . . . $Na_2O$ | 0·22 | 0·23 |
| Potassium oxide . . . . $K_2O$ | 0·46 | 4·79 |
| Water . . . . . $H_2O$ | 13·91 | 2·54 at 110° C.<br>6·52 above 110° C. |
| Carbon dioxide . . . . $CO_2$ | 3·73 | 0·38 |
| Phosphorus pentoxide . . $P_2O_5$ | 0·07 | 0·10 |
| Sulphur trioxide . . . . $SO_3$ | 0·09 | .. |
| Titanium dioxide . . . . $TiO_2$ | 0·99 | 0·20 |
| Manganous oxide . . . . MnO | ? | none |
| | 100·16 | 99·95 |

These analyses are stated in terms that somewhat widen our views; but a more generalized view of the variations likely to occur in terrestrial clays is obtained by considering the clay now being formed on the beds of the great oceans, notably the Pacific. The red clay is the product of the decomposition in the sea of the volcanic minerals with which the deepest parts are strewn, and is made up of two chemically distinct ingredients—hydrated amorphous silicates of an argillaceous character and finely-divided silicates, partly vitreous and partly crystalline, which represent what is left of the mother substances of the former. The first-named component—says Dr. Caspari, who has recently investigated it—does not differ in general physical properties from the essential constituent of terrestrial clay, and chemically contains far more silica than corresponds to the kaolinite or "ideal clay" formula ($Al_2O_3$, $2SiO_2$, $2H_2O$). A number of analyses of specimens taken from certain defined areas have been made of this clay; the most recent being one by Dr. Caspari, who concludes that, while it is not at all improbable that colloidal hydrated alumina and silica are present in the argillaceous portion of red clay, one may incline to the belief that the dominant molecular species there is, in the language of Van Bemmelen, an "absorption compound" represented by the formula $SiO_2$ (silica), $m Al_2O_3$ (alumina), $n Fe_2O_3$ (ferric oxide), $p H_2O$ (water), where on the average $m = 0{\cdot}20$, $n = 0{\cdot}10$, and $p = 0{\cdot}69$. But this simplicity of type is to be contrasted with the large number of components found when a mixed sample is taken and analyzed, as was done by F. W. Clarke, the Chief Chemist of the U.S. Geological Survey. Owing to the renown of the chemists of the U.S. Geological Survey for this class of work, Sir John Murray, of Edinburgh, made up a sample of this clay described as "Composite"), and arranged for an analysis to be made that should show the several rare and minor elements, not previously determined quantitatively therein.

The following analyses A and C give the composition of the clay from the sea bottom in all the great oceans, as represented by 51 samples, and terrigenous clays, as represented by 52 samples respectively. In A, additional determinations by Hillebrand revealed the presence of traces of molybdenum, and E. C. Sullivan also found the following percentages of heavy metals: CuO, 0·02; PbO, 0·007; ZnO, 0·004; $As_2O_3$, 0·0007. No less than 22 distinct constituents are enumerated; and it is noteworthy that the same minor oxides were detected by Clarke as by Gibson in his exhaustive analysis of manganese nodules. The quantity of these minor oxides was in greater percentage in the manganese nodules than in the red clay, showing that the former possess the property of concentrating these oxides out of solid and aqueous surroundings.

*F. W. Clarke's Analyses of Red Clay.*

| Name of Component and its Formula. | A Percentage. | C Percentage. |
|---|---|---|
| Silica . . . . . $SiO_2$ | 45·32 | 46·64 |
| Alumina . . . . . $Al_2O_3$ | 13·26 | 14·08 |
| Ferric oxide . . . . . $Fe_2O_3$ | 7·20 | 4·14 |
| Ferrous oxide . . . . . FeO | 0·70 | 1·88 |
| Magnesium oxide . . . . . MgO | 3·05 | 1·95 |
| Calcium oxide . . . . . CaO | 6·82 | 7·20 |
| Sodium oxide . . . . . $Na_2O$ | 3·63 | 2·98 |
| Potassium oxide . . . . . $K_2O$ | 2·43 | 1·84 |
| Water at 105° C. . . . . $H_2O$ | 3·28 | 4·73 |
| Water at temperature above 105° C. . $H_2O$ | 5·93 | 5·86 |
| Titanium oxide . . . . . $TiO_2$ | 0·82 | 1·04 |
| Carbon dioxide . . . . . $CO_2$ | 3·91 | 4·05 |
| Phosphorus pentoxide . . . . . $P_2O_5$ | 0·25 | 0·17 |
| Vanadium " . . . . . $V_2O_5$ | 0·028 | 0·028 |
| Sulphur trioxide. . . . . $SO_3$ | 0·48 | 0·32 |
| Sulphur . . . . . S | trace? | 0·11 |
| Chlorine . . . . . Cl | 2·77 | 2·25 |
| Nickel and Cobalt oxides . . . (Ni-Co)O | 0·032 | .. |
| Manganous oxide . . . . . MnO | 0·83 | 0·10 |
| Barium oxide . . . . . BaO | 0·17 | 0·05 |
| Strontium oxide . . . . . SrO | 0·046 | 0·25 |
| Chromium oxide. . . . . $Cr_2O_3$ | 0·01 | 0·044 |
| Copper oxide. . . . . CuO | 0·02 | 0·016 |
| Carbon . . . . . C | .. | 1·38 |
| | 100·986 | 100·883 |
| Less oxygen . . . . . | 0·62 | 0·56 |
| | 100·366 | 100·323 |

The foregoing analyses by F. W. Clarke and his coadjutors are given to show the wide range of possible components of clays, and also the minute quantities of each ingredient that can now be determined by analysts who have specialized in this class of work. The origin of fire-clays is known to be diverse, and therefore the list of elements already enumerated cannot be regarded as covering all varieties. But every piece of definite information such as the above serves to widen our outlook, and give us a truer conception of the possible complexity of the raw material embraced under the term refractory. They also serve to emphasize the necessity of watching the content of manganese compounds in clays—a matter already discussed by me in the "Journal" for July 25, 1905 (p. 230). It was there shown that, in the case of certain bricks used in a carburetted water-gas plant, manganese compounds were present to an extent that demanded attention; and further that this view was confirmed by considerations based upon the experiments of Guntz, as to the behaviour of the oxides of manganese towards the gases, hydrogen, carbon monoxide and dioxide, when heated therewith. This brings us quite naturally to the second suggested extension of the labours of the Refractory Materials Committee—namely, the consideration of the effect of atmosphere in the testing and using of the fire-clay goods in the various parts of the coal gas and carburetted water-gas plant.

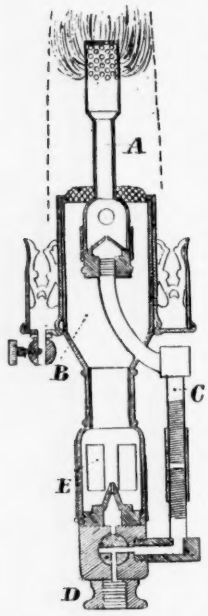
In the specification of Section II. (p. 95 of the "Transactions" of the Institution for the year 1911), the Committee express their intention to take up at a later date the question of porosity as connected with the bricks used in the carburettors and superheaters of carburetted water-gas plants; and no doubt this would bring them face to face with the question of the alternations of oxidizing and reducing atmosphere. Recent discussions have been directed to the question of atmosphere as related to retort-settings, and very properly so. But no doubt it will be found necessary to, in thought, divide the two parts of the practical experience—namely, on the one hand, the composition and quality of the fire-clay goods, and, on the other hand, the construction and mode of operating the furnace and the setting. If the latter be considered for a moment, it will be apparent that it should be the aim of the gas maker to avoid having in his retort-setting a reducing atmosphere. No carbon monoxide should enter the regenerator or recuperator, and the requisite amount of secondary air having been admitted in the combustion chamber, the intervening space must have its contents determined by the readiness with which the air and the producer gas can get at each other. Clearly this indicates that it is desirable, if the highest temperatures are to be attained, that there should be no space where there is a serious deficiency of oxygen. The aim is, of course, to have complete combustion without local cutting heat, on the one hand, and without combustion occurring, on the other hand, near the place of leaving the outside of the last retorts, where it can do but little good. As the production of the heating gases is known to vary with the amount of ash and clinker on the grate-bars, it will be necessary to minimize this variation if the perfect balance inside the combustion chamber is to be preserved between the

combustible gas and the supporter of combustion, oxygen. Thus no doubt the atmosphere surrounding gas-retorts will at certain times be oxidizing and at other times reducing, dependent upon the perfection of the adjustment of the producer gas and secondary air supply, and also upon the arrangement of the brickwork in the setting. But this variation must be small when compared with that which of set purpose exists in the carburettor and superheater of a carburetted water-gas plant.

The alternations from run to blow are so frequent, and the consequent incidence of the atmosphere upon the life of the brickwork so important, that no specification for the last-named material would be of any real value, unless it took this aspect into serious consideration. This being so, and carburetted water gas being made to such a large extent throughout the world, it would appear the best policy to face the difficulties inherent in formulating tests in which the nature of the atmosphere is ascertained and conditioned. The difficulties being acknowledged, it would first be needful to construct a furnace where a gas of constant composition can be burned for the heating of the refractory material undergoing test, and where the air supply could be measured and the nature of the products of combustion ascertained. This discovery of facts would mean a period of investigation in the chemical laboratory; and not till the initial difficulties had been surmounted would it be wise to frame a specification to be issued to members of the Institution or makers of fire-clay goods. After all, the various elements that go to make up such a test are those which gas engineers are well qualified to investigate, and only the determination to succeed is wanting to make the suggestion speedily become a realization.

Information obtained while designing and forming the furnace, and in formulating the mode of testing, as well as in using the test on a variety of fire-clay blends, would doubtless prove of great value to the manufacturer; for he knows already in a general way that the conditions of atmosphere in his kilns are of great importance to the finished product; while the gas engineer would gain thereby information that he could correlate with the atmospheres found to exist at various parts of his retort-settings and in his carburetted water-gas plant.

## COMBINED HIGH AND LOW POWER INCANDESCENT BURNER.




The burner shown in the annexed illustration was brought by M. Grebel under the notice of the members of the Société Technique du Gaz at their recent congress at Toulouse. It is constructed for two rates of consumption—either that of an ordinary upright burner, 4·2 cubic feet, or the reduced rate of 2·1 or even 1·5 cubic feet—obtainable by the simple turning of a three-way tap. The action of the appliance will be readily understood from the diagram. The burner A, made entirely of steatite, and located in the head of the principal burner B, is supplied with gas by the pipe C. When the tap D has been turned into the position shown, the gas passing through the pipe A is consumed in the small burner, and only the upper part of the mantle is raised to incandescence. The supply of primary air is obtained through the openings E. On the same principle, there may be fitted up a bunsen pilot-light burning with a blue flame, which may be practically applied for public lighting.

## MAKING CONNECTIONS ON CHARGED MAINS.

This was the subject of a paper submitted to the Société Technique at their last meeting. It contained a description of a fairly simple arrangement, invented by M. Grange, a foreman plumber in the service of the Toulon Gas Company, enabling connections to be made on charged mains without fear of loss of gas. The appliance used is shown in the accompanying illustrations.

The process of making a connection consists in cutting as deeply as possible, but not quite through, the portion of pipe to be removed; then putting into position a sleeve, shown in fig. 1, furnished with a flanged T-piece. On the flange is a dovetailed mortise, in which can slide a metal plate (fig. 3) serving as an obturator. This plate has a tubulure furnished with a stuffing-box. There is fixed to the flange, by means of bolts, a leather sleeve (fig. 2), through which is passed a long cutting-tool (fig. 5). Guided, by the incision made, the pipe is cut through. When the piece is detached, the obturator is closed, and for the stuffing-box

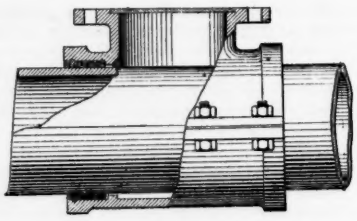


Fig. 1.

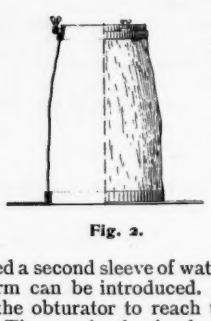


Fig. 2.

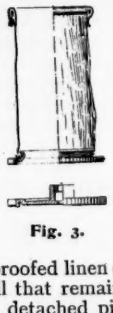


Fig. 3.

is substituted a second sleeve of waterproofed linen (fig. 4) through which an arm can be introduced. All that remains to be done is to open the obturator to reach the detached piece of pipe to remove it. The opening having been made—the obturator being still in position—the leather sleeve is removed, and the T-piece attached by means of the upright flanged end. The connection is then finished, and to complete the job the obturator is replaced by a plate of lead-lined sheet iron, coated with white lead, and forced in. This method of making connections, which is applicable, with some variations, to sheet-iron pipes, obviates the use of bags, and does not necessitate any stoppage in the distribution of gas.

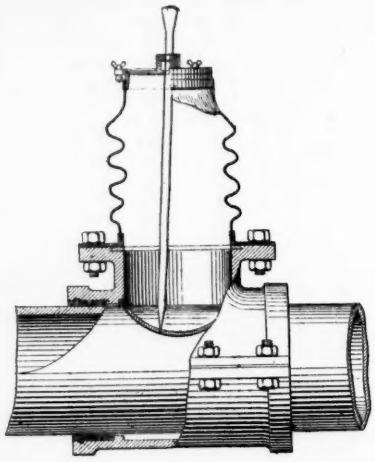


Fig. 4.

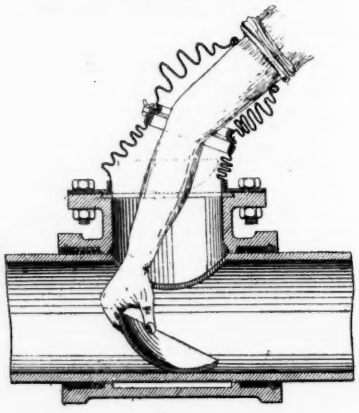


Fig. 5.

The author of the paper said he had no hesitation in recommending the arrangement he had described, because he had found it simple, practicable, and economical. He mentioned specially a case in which he had made a connection of a 10-inch pipe on a 16-inch feeder main at the end of November, when the slightest trouble with the distribution is most annoying. The main was in a public thoroughfare where there is considerable traffic, and had been laid at a depth of 6 ft. 6 in. The work, with the exception of opening the ground, was done in less than a day, without accident, by a plumber and a labourer. The author added that the appliance had been patented for France. A similar appliance has been proposed for removing naphthalene deposits in mains.

# THE TECHNICAL DEVELOPMENT OF THE HEATING OF GAS-MAKING SETTINGS.

By Dr. KARL BUNTE, of Carlsruhe.

**[Abstract Translation of a Paper read at the Meeting of the German Association at Strassburg.]**

The Instructional and Experimental Works of the German Association has carried out during the past six years many efficiency trials of different types of gas-making settings. Apart from the principal object of ascertaining the figures for the output or efficiency, attention has also been given to the advances in the heating of the settings, by which their internal economy is connoted. In endeavouring from the observations made to discuss the advances which have taken place in the heating of settings, the author will not pronounce judgment on the different systems or their economy in respect of cost of installation, cost of working, or limit of applicability. But he hopes to present some facts which may be of service to others when considering all the systems.

The considerable increase in the make of gas and the reduction in fuel consumption may be ascribed to three causes—viz.: (1) Increased temperature of carbonization; (2) Greater degree of extraction of the gas, and an improved ratio between the time occupied in stoking and the time required for working off the charge; (3) Better design of the settings as regards the heating arrangements.

## EFFECT OF HIGHER HEATS.

The effect of the temperature of carbonization on the quantity and quality of the products is independent of the type of setting. A higher carbonizing temperature primarily increases the heat units obtainable in the gas and shortens the time required for working-off the charge. If the high temperature acts also on the liberated gas, the quantity of gas is increased, while its calorific power, illuminating value, and specific gravity are decreased. At the same time there is a decrease in the yield of ammonia and an increase in that of cyanogen and sulphuretted hydrogen. Further, the tar becomes more viscous and naphthalene is produced. But, other conditions being unchanged, with increase in the yield of gas and decrease in its calorific power, the product of make and calorific power (the calorific valuation figure) increases by a little as the temperature of carbonization is raised. Broadly, carbonizing systems may be compared on the basis of the calorific valuation figure obtainable for the same number of heat units in the fuel consumed in heating the settings. But when an addition of water gas is contemplated, in order to produce a mixed gas of standard calorific power, the calorific power (from which the calorific valuation figure has been computed) has a direct bearing on the quantity of water gas which may be added. For instance, if gas of 540 B.Th.U. gross per cubic foot is aimed at, and 11,600 cubic feet of coal gas of a gross calorific power of 625 B.Th.U. can be obtained per ton of coal, the corresponding calorific valuation figure of 7,250,000 B.Th.U. per ton would be obtained with a make per ton of 13,425 cubic feet of gas of 540 B.Th.U. per cubic foot. But to the 11,600 cubic feet of gas of 625 B.Th.U. there may be added about 3865 cubic feet of water gas, of 285 B.Th.U. per cubic foot, in order to bring the calorific power of the mixed gas to 540 B.Th.U. The total volume of mixed gas of this grade would therefore be $11{,}600 + 3865 \doteq 15{,}465$ cubic feet.

Generally speaking, increased temperature is advantageous to the production of gas, but is disadvantageous if it acts on the produced gas. As the superheating to which the gas is subjected depends on the extent to which the carbonizing chamber is filled, all modern types of settings with one exception aim at completely filling the carbonizing space.

## EFFECT OF EXHAUSTION OF CHARGE.

Passing on to the second cause of the increased make of modern settings, the extent to which the gas is exhausted or extracted from the coal is clearly limited through the point being reached at which the gas produced in unit time is of lower value than the fuel consumed in the same time. If it is assumed that 16 lbs. of coke are consumed per 100 lbs. of coal carbonized with both of two systems in which the charge is worked off to the same extent in four hours and twenty-four hours respectively, and that one ton of coke has about the same value as 17,500 cubic feet of gas (in the retort-house), then with the four-hour charges it would pay to extend the period of carbonization by half an hour only if more than 350 cubic feet of gas could be obtained per ton of coal in the extra half hour; whereas, with twenty-four hours for working off, an extension of half an hour would be warranted if an additional 55 cubic feet per ton could thereby be secured. Generally, however, the attempt is made to secure complete carbonization, especially with large carbonizing chambers, rather by varying the temperature or the weight of charge (which may be varied to a certain extent by altering the size of the coal) than by altering the time allowed for carbonization. The same consideration applies, however, in these cases—viz., that the effect of the change of procedure need not be so great with long periods of carbonization as with short periods. With long carbonizing periods, the working may be more readily adapted to secure complete carbonization, and small fluctuations or inequalities of temperature of different retorts or ovens do not have so great an effect on the exhaustion of gas from coal.

## EFFECT OF TIME OCCUPIED IN STOKING.

The time spent in charging a given quantity (say, 10,000 tons) of coal has considerable influence on the consumption of fuel and the duty of the setting. Thus with horizontal retorts charged by hand, the time of stoking may be 5 minutes, and a charge may be worked off in 4½ hours—which gives 26·7 minutes per diem in which the retort is idle. The retort carbonizes (say) 15¾ cwt. of coal per diem; hence for every 10 tons carbonized the retort is idle for about 5½ hours. On the other hand, a large oven in which a charge of 11 tons is carbonized in 24 hours will require only 15 minutes for charging, or (say) 13½ minutes per 10 tons of coal. These points are of great importance; but the possibility of any further advance lies in the heating arrangements of the setting. This is the centre from which development must take place.

## EFFECT OF IMPROVED HEATING ARRANGEMENTS.

The tubular retort and the fire-clay of which it is constructed have undergone little change for a long period, so far as the majority of gas-works are concerned. Carborundum has recently, however, been considered as a substitute for fire-clay, on account of its resistance to higher temperatures and its better conductivity for heat. The pattern and construction of the settings have undergone great changes. The development of large works led to manual labour being replaced by stoking machinery. In England through horizontal retorts were introduced; in France, inclined retorts. The natural step from the latter was to set the retorts upright; but this apparently simple step involved a revolution in the heating arrangements, and a rupture with previous practice. Inclined retorts also led up to the inclined ovens or large chambers, of which the author believes the first example was a Coze setting in which the three superposed retorts were replaced by a single chamber. Once the possibility of making gas in large chambers had thus been established, and by the experience of firms who had previously concerned themselves only with the erection of coke-ovens, the transition to large horizontal chambers or ovens was easy. The vertical retort and the oven proved the advantage of carbonizing with charges which completely filled the vessel, and similarly good results were then obtained from heavy charges in horizontal and inclined retorts. The changes in the carbonizing vessels were attended by improvement in the ratio of volume of charge to the interior or heating surface of the retort, and in the ratio of heating surface to the outer surface of the setting which is exposed to cooling influences. The transition from an old to a new type of setting involves a gradual adaptation of the heating arrangements to the altered conditions.

## GAS-HEATED SETTINGS.

The simple grate was originally used for heating; but with deepening of the fuel bed, the utility of admitting air above the fuel to consume unburnt gases escaping from it was discovered, and this air was next heated by the flue gases. Producer-gas firing and regeneration of heat were first introduced in Paris by Siemens in the sixties; and thus the heating process was divided into the two sections—viz., gas production and secondary combustion. The clinker, however, gave trouble in the early producers. This was overcome by Liegel, by the concentration of combustion on a narrow zone, where the clinker was fused and flowed away; and by a Committee, on which Schiele, Schilling, and H. Bunte sat, by the introduction of steam. The latter plan had the advantage of reducing heat development in the producer and transferring it to the retort-furnace. It also made it feasible to preheat the primary as well as the secondary air, and thus to reduce the loss of heat through the flue gases. For economy of space and cost of construction, and to avoid interference with the mechanical disposal of the discharged coke, the producer was frequently built within the setting, between the two sides of the regenerator. This disposition, owing to the restriction as to dimensions, involved no advantage from the purely heating standpoint. On the other hand, detached producers were constructed with the object of using the hot coke as discharged; and in order to gain the full benefits of the semi-water-gas process, central independent producers were erected.

The position of the producer relatively to the setting has considerable effect on the utilization for the working of the settings of the heat developed in the producer. With a true producer, erected close in front of, or behind, the settings, the whole of the heat of the gas passes to the burners. With producer gas of the ordinary composition, and with the primary air and steam preheated to about 250° C., the gas should, by calculation, leave the coke at a temperature of about 700° C. In the gas-conduit of a detached producer fed with hot coke, a temperature of 780° C. will be found, which is increased by radiation in the gas distributing passage. But with true producers built close in front of the setting, temperatures of the gas of 940° C. have actually been found, and with built-in producers 1050° C. in the oxide passage or above the fuel. The effects of the conservation of the heat of the coke and of radiation and conduction are therefore obvious. The heat thus conserved represents 7 to 9 per cent. of

the calorific power of the coke consumed. As to feeding with hot coke, if the latter has a temperature of about 1000° C., its sensible heat is equivalent to 5 to 6 per cent. of the calorific power of the coke. This serves to reduce the coke consumption in a setting from 16 to 15 per cent. of the weight of coal carbonized. Feeding with hot coke, therefore, is evidently desirable, especially if the heat required to evaporate and raise to 1000° C. the water unavoidably present in cold coke is borne in mind. With 5 per cent. of water, this heat represents 0·85 per cent. of the calorific power of dry coke containing 10 per cent. of ash.

An increase of 400 cubic feet in the make of gas per ton of coal is equivalent to a reduction of 3 per cent. in the quantity of coal to be carbonized. Taking coal and coke as of equal value, it follows that there is no economical loss in expending 3 lbs. more coke per 100 lbs. of coal carbonized to secure an increase in the make of gas of 400 cubic feet per ton.

### Central Producers.

The central producer foregoes the utilization of the sensible heat of the coke and the sensible heat of the producer gas. The producer gas process and the water-gas process are, however, with it, brought as nearly as possible to an equilibrium; so that a gas is obtained consisting of (say) 3·65 per cent. of carbonic acid, 29·1 per cent. of carbonic oxide, 10 per cent. of hydrogen, and a little methane. The heat of combustion of this gas represents about 80 per cent. of the calorific power of the coke. The greater part of the heat liberated in the producer and of the sensible heat of the producer gas can be utilized in a steam-jacket or annular boiler, which produces more than enough steam for the supply of the producer as well as for driving fans and dust-extractors. The actual loss of heat through radiation, conduction, and the clinker is less than 5 per cent. While only something over 80 per cent. of the calorific power of the fuel is available for heating the setting, yet if the producer gas as well as the secondary air is strongly preheated a temperature of 1070° C. is attained at the nozzles, and heat equivalent to 25 per cent. of the calorific power of the fuel is recovered from the flue gases and from radiation and conduction to effect the preheating. Thus the heat-balance becomes a trifle more favourable than with the producer built into the setting. The central producer, moreover, presents the advantage that the gas can be freed from dust or blown-ash, and the fire-brick material consequently benefits, and metal cocks may be used to control the supply of gas to each furnace. But preheating of the producer gas is essential for economical working with central producers. The fact that the clinker from the Kerpely (central) producer contains regularly only 0·6 to 0·7 per cent. of the fuel shows that it constitutes technically a great advance on the former types of producers, in which considerable quantities of fuel were removed in pricking-up and clinkering.

### The Retort Furnace or Oven.

Passing from the producers to the furnace, or from heat production to heat development, consideration of the changes in settings is instructive, and may point the way to further advances. Originally, retort heating followed the same lines as boiler heating—*i.e.*, the hot gases from the grate circulated round the retorts. The result was very uneven heating of the retorts. Then secondary air was introduced in a strong current at right angles to the unburned gases above a rather deeper bed of fuel. From this procedure producer gas firing developed; but, unfortunately, even to the present day the gas and air streams frequently meet at right angles, whereby air and gas are thoroughly mixed, and short flames are produced. Producer-gas firing, however, allowed combustion to take place gradually throughout the setting, instead of merely locally; and uniform heating could thus be ensured. But the short flames which result when gas and air impinge at right angles should be avoided. The gas and air streams should meet on almost parallel courses; so that the admixture is gradual, and long flames are produced. In all the more perfect modern settings this occurs.

The Coze setting involved modification of the producer setting for horizontal retorts only so far as was necessary from the mechanical standpoint, in order that the heating gases should reach the different levels. These settings demanded more uniform regulation and careful handling of the heating arrangements. So far as heating was concerned, the inclined large chamber setting followed the lines of the Coze setting; but the heating in parallel upright passages or flues was also customary in coke-ovens. As soon as the rising gas streams were distributed in separate passages, the difficulty arose that a flue which was hotter than the rest drew more gas into itself, with the result that the inequality of heating became intensified. The difficulty of regulation is very great, because the rush of gas in the upper heating passages is so strong that observation and control of it is extremely troublesome.

### Ovens and Vertical-Retort Settings.

These technical difficulties in the heating of the inclined carbonizing chambers led many constructors to give up the inclined, in favour of the horizontal, chamber. Herr Ries, however, solved the heating problem in his new pattern of Munich chamber setting, by introducing heating parallel to the inclination of the chamber, and thus took advantage of the natural up-take. These chambers being broader at the lower end, in order to facilitate the discharge of the block of coke, the greatest heat is required at this end, and with the earlier forms of the setting the draught naturally made the back or upper part of the setting the hottest. The restricted space for the heating passages in the lower part naturally increased the velocity of the gas there, gave too violent mixing, and consequently combustion with short flames. More gradual mixing of the gas and air has been secured in the new settings by inserting, half-way up, tongues or feathers which contract the cross section of the passages. The heating of the setting is thus made thorough and uniform. Horizontal chambers are heated broadly on the same principles as coke-ovens; the improvements being chiefly that heating of the roofs of the chambers, which causes superheating of the gas, is avoided as far as possible.

The flame development takes place quite differently in vertical retort settings and the Woodall-Duckham continuous retorts. In vertical retort settings, the flame takes a spiral course from below upwards. The temperature is highest in the bottom section—viz., 1300° to 1350° C.—falls in the next section to 1100° C., and in the third section to 1000° C. The natural consequence of this greater surplus of heat in the lower part of the retort is that this heat may be utilized in the last stage of distillation for the production of water-gas. The regulation of the flame formation is extremely well effected in the Dessau settings. Brattices ensure the gas streams taking parallel courses, and then at suitable positions mixing blocks are inserted which churn up and thoroughly mix the streams of gas and air. It is different with the Woodall-Duckham continuous retort setting, in which the retorts are heated in the upper third by eight burners. The effluent gases rising up give a preliminary heating of the coal; and in the lowest part of the retort the incandescent coke passes into a zone where it parts with its heat to the secondary air.

### Heat Storage.

Another aspect of the heating of carbonizing vessels is afforded by the employment in turn of higher and lower temperatures, as in the heat storage system of a new type of chamber setting. The heating passages become alternately firing passages and flue-gas passages. By this method of heating, the temperature can be raised for a time, without damage to the material, higher than if the material were continuously worked at very high temperatures. The average temperature in this case is from 1300° to 1350° C.: but in the latter part of the heating period temperatures of 1400° to 1450° C. and upwards are attained. When the heating flue is changed over to a waste-gas passage, the temperature gradually falls to 1200° to 1300° C. Considering that in the heating of carbonizing vessels there is a fall of temperature between the heating chamber and the carbonizing chamber of about 200° C. with an average temperature of 1200° C. in the furnace, it is obvious that if the difference is doubled, by temporarily raising the temperature to 1400° C., considerably increased transference of heat must take place during this period of high temperature. This system of alternation with half-hourly or twenty-minute changes allows the high temperature periods to follow rapidly one on the other, and forces the working without considerably increasing the average strain on the material by the high temperatures.

### Waste-Heat Recovery.

An important factor in economy in all systems of settings is the recovery of the heat of the products of combustion. The flue gases must escape from the heating chamber or furnace proper at about 1000° C. With a content of 19 per cent. of carbonic acid this means a loss of about 60 per cent. of the calorific power; but a very large proportion of this heat is returned to the heating chamber by preheating of the air required for combustion. If we consider how much heat can be transferred from the spent gases to the secondary air, experiments show that with producer gas firing 1·6 to 2·2, or, in round figures, 2 volumes of combustion gases are present for every volume of secondary air.

The heat capacity of the combustion gases—viz., 0·37 at an average recuperator temperature of 700° C.—is rather higher than the heat capacity of the air—viz., 0·34. Thus, theoretically, only about half the heat contained in the spent gases can be transferred to the secondary air. If the spent gases enter the regenerator at about 1000° C., the secondary air will at best cool the flue gases to about 500° C. Practically, it is found that, in consequence of radiation and conduction from the upper part of the setting, the flue-gas temperatures before the water-pan with self-contained producer settings are from 700° to 800° C., and with other settings, such as vertical settings, where there is less heat radiated and conducted from the upper part, about 650° C. After the water-pan the temperatures fall to 500° or even 300° to 350° C. If the flue gases escape at lower temperatures, the heat may be regarded as loss by radiation and conduction, or through leakages and dilution with air. Naturally, it is different with coke-ovens in which coal gas is consumed, as the heat capacity of the air required for combustion is to that of the flue gases in the ratio of 0·75 : 1·00. In this case obviously the secondary air can take up a very considerable proportion of the heat of the flue gas, and flue-gas temperatures of 250° C. can be realized.

### Types of Recuperator.

For the effective working of a heat recovery system, it is necessary to avoid any admission of air to the flue gases—*i.e.*, the recuperator must be sound. In the special system of heat storage with alternating working, this difficulty disappears. With the ordinary recuperator, in which the heat is transmitted through the walls, their soundness is a very important factor. In order to attain it, different methods of construction have been used, which may broadly be reduced to three types. The Munich pro-

ducer setting has a band-like recuperator—*i.e.*, alternately flue gas and secondary air strata; and the transference from the upper to the next lower layer is through box-like vertical passages, which are so opposed that they are alternately in front and at the back of the setting. The soundness of this type of recuperator, especially at the connecting passages, is not always easily secured. The second type of recuperation has a certain advantage in this respect. With it, flue gas, air, and flue gas are led through series of passages placed vertically beside one another, and flue gas is always over flue gas and air over air, and the heat transmission takes place horizontally. This system, which is adopted in many semi-producer settings, and in the Munich carbonizing chambers and the Dessau vertical retort-settings, has the advantage of ready accessibility. The joints in the latest construction are made with long surfaces. The depth of the recuperator with some systems of setting is specially advantageous in regard to their accessibility.

The third system of recuperation depends on one or both gases being led into blocks so shaped that they build up into tubes. The pressure of the superstructure in this case is not carried by the recuperator, but by special supports, in order that the blocks may have as thin walls as possible. The results should be quite favourable; but the author is unable to report on them from his own experiences.

### Sundry Heat Losses.

In many places very considerable heat is lost through the heat left in the coke. The utilization of the heat of the flue gases is still comparatively imperfect. Generally, this heat is only employed for raising steam for the producer or for slight preheating of the moist primary air. The heat contained in the combustion gases before they enter the regenerator is from 50 to 60 per cent. of the calorific power of the coke. Of this heat, 45 to 65 per cent. —*i.e.*, between 25 and 35 per cent., or (say) one-third of the total available heat of the coke—is lost, although at the most half this would be necessary for the chimney draught. Chamber settings with central producers and preheating of the producer gas do, and must, utilize more of this heat. If the products of combustion escape at 270° C., they carry away only about 16 per cent. of the calorific power of the coke. The hot coke contains sensible heat equivalent to about 25 per cent. of the calorific power of the coke used as fuel, and only in certain types of settings is a part of this heat utilized by feeding the producers with hot coke. About three-quarters is lost in quenching the rest of the coke. Some attempts have been made—*e.g.*, by Bolz and Strache—to utilize a part of this heat. The condensation or cooling of the gas, liquor, and tar dissipates 10 to 15 per cent. of the heat of the fuel used.

The losses by radiation and conduction from the setting are considerable. For a Paris setting of nine retorts, Euchêne calculated that they were about 15 per cent. Diminution of the exposed surface of the setting directly reduces the radiation losses. It is well known that the end beds of a bench are at a disadvantage in this respect compared with the middle beds. Much remains to be accomplished in the rational utilization of the heat in carbonizing settings. The quantities of heat available for utilization, however, are changing, partly hourly and partly with the season of the year; and hence the primary object should be to utilize the heat as far as possible in carbonization itself.

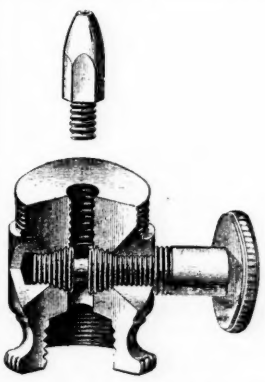
## The Memorial Tablet to Murdoch.

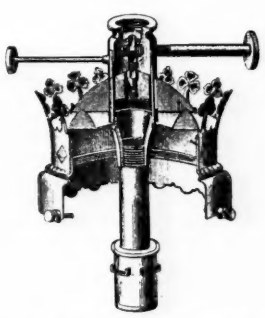
It may be remembered that at the meeting of the North British Association of Gas Managers in Aberdeen last year it was decided to devote some of the funds of the Association to the erection of a memorial tablet to William Murdoch at his birthplace—Lugar, in Ayrshire. The decision was the outcome of a movement initiated by Mr. J. W. Napier, of Alloa, who, while taking a holiday in Ayrshire, visited Lugar, and was surprised to find that no mark had been placed on the house in which Murdoch was born. Action was duly taken, and the execution of the tablet was entrusted to Mr. H. S. Gamley, A.R.S.A. Edin., who is well known for work of this kind. The tablet he has produced is regarded as surpassing all his previous efforts. It bears a medallion of Murdoch, and has a suitable inscription. We learn from Mr. Napier that the unveiling ceremony will be performed on the 26th inst., at about half-past one. Subsequently the company will adjourn to the Lugar Institute, where luncheon will be provided by the interested generosity of Robert Angus, Esq. (of Messrs. William Baird and Co.), of Ladykirk. Afterwards the President of the Association (Mr. James M'Leod, of Greenock) will take the chair, and Mr. Hislop will deliver a short appreciation of Murdoch. As this is the first occasion of the recognition by the gas industry of the worth and genius of Murdoch at the place of his birth, it is hoped that there may be a good gathering. Mr. Napier was at Lugar last Tuesday forwarding the arrangements; and he hopes to send out the invitations early this week. All members of the North British Association will be invited, as well as the Presidents of other Associations.

The late Mr. Ulick John Burke, the Chairman of the Brentford Gas Company, Deputy-Governor of the Gaslight and Coke Company, and Director of the Lea Bridge District Gas Company, whose death was announced in the "Journal" for the 18th of March, left estate valued at £51,624 gross, with net personalty amounting to £47,428.

## REGULATING UPRIGHT AND INVERTED BURNERS.

Neither upright nor inverted gas-burners can be perfectly regulated by the makers before they are fixed, not only on account of the different pressures in use, but more especially owing to the various qualities of gas sent out for consumption. Gas-fitters who put the burners in position regulate them for the gas and the pressure at the time; but they are, nevertheless, liable to be put out of order more or less frequently by changes in the pressure and specific gravity of the gas—a trouble which is not entirely obviated by the use of a rheometer. This being the case, the question has arisen as to whether it would not be advisable to place consumers in a position to regulate their burners themselves.





M. Grebel thinks no risk would be run by doing so, seeing that for some time they have been familiar with certain burners of German make, by which the consumption of gas and the admission of primary air can be regulated. He showed to his colleagues of the Société Technique du Gaz, at their recent Congress, a new arrangement brought out by the "Couronne" Company which is decidedly progressive. It will be seen from the accompanying illustrations that it consists essentially of a micrometric screw working in the body, which serves as an internal screw, and carries the ejector. The first-named screw is cut sufficiently deep to leave a free space. When it is more or less engaged in the internal screw, the communication between the outlet and the inlet of the gas is proportionately checked. The illustrations given show the arrangement adapted to upright and inverted burners.

## SCHOOL AND LIBRARY LIGHTING.

The current number of the "Illuminating Engineer" contains the interim reports of two Joint Committees appointed to consider the subject of the artificial lighting of schools and libraries. The School Lighting Committee comprised the President (Professor Silvanus Thompson), Hon. Secretary (Mr. L. Gaster), Assistant-Secretary (Mr. J. S. Dow), and several members—including Mr. F. W. Goodenough, the Chairman of the Council—of the Illuminating Engineering Society, and representatives of the Association of Technical Institutions, the Association of Teachers in Technical Institutions, the London Teachers' Association, and the Medical Officers of Schools Association, and Dr. N. Bishop Harman. The Chairman was Dr. J. Kerr, the Medical Officer of the Education Department of the London County Council. The reports were issued by order of the Council of the Society.

### Report on School Lighting.

The Committee on School Lighting was appointed in 1911, following the discussion of the papers on "Natural and Artificial Illumination of Schoolrooms," read before the Society by Dr. Kerr and Dr. Harman in that year.* The first meeting of the Committee took place on March 7, 1912, when a list of subjects for consideration was drawn up. The terms of reference of the Committee included both daylight and artificial illumination; but it was resolved that the latter subject should be dealt with first. There are a number of investigations which still remain to be pursued in detail; but it was considered that the time was ripe to issue an interim report, embodying the conclusions so far reached.

### Intensity of Illumination Required.

The intensity of illumination necessary in schoolrooms depends on the nature of the work carried out. In many details, further experience is necessary before precise limits can be assigned to these quantities in specific cases. A distinction might be drawn between the needs of children and the requirements of adults. But inasmuch as the results of working by defective illumination seem likely to be proportionately more serious in the case of children, the Committee have considered mainly their needs in

* See "Journal," Vol. CXIII., p. 526.

making these suggestions. A broad distinction should also be drawn between ordinary clerical work (reading and writing, &c.) and special work (art and metal work, embroidery, &c.). Experiments on this point were conducted by the Committee; the illumination being adjusted until it appeared sufficient for various classes of work, and photometric measurements then made.

As a result, it is suggested that (*a*) for ordinary clerical work, the minimum illumination measured at any desk where the light is required should not fall below 2 foot-candles,* (*b*) for special work (art classes, drawing offices, workshops, and stitching with dark materials, &c.), a minimum of 4 foot-candles is desirable; and (*c*) for assembly-rooms, &c., and for general illumination, a minimum of 1 foot-candle, measured on a horizontal plane at 3 ft. 3 in. from the ground. The question of the permissible diversity factor remains to be considered.

It was also recommended, in view of the general recognition of the prejudicial effect on the eyes of children of fine needlework carried on by artificial light, that only coarse work on white material should be executed by artificial light in elementary schools; the minimum in this case being the same as for (*a*).

### Direct, Indirect, and Semi-Indirect Lighting.

The Committee then proceeded to consider various methods of lighting schoolrooms. A series of questions relating to the respective merits of direct, indirect, and semi-indirect lighting were drawn up and submitted to Mr. J. G. Clark, Mr. V. H. Mackinney, Mr. T. E. Ritchie, and Mr. F. W. Willcox. The thanks of the Committee are given to these gentlemen for the trouble they took in preparing answers to the questions and attending before the Committee to state their views. After hearing the evidence, the Committee took note of the respective advantages of these methods for certain classes of work, but decided that the above standards of illumination should be provisionally adopted irrespective of the method of lighting.

### Blackboard Lighting.

The question of blackboard lighting was next considered. Whereas the minimum illumination suggested for reading purposes—viz., 2 foot-candles—might be enough in the case of a small class-room, where white chalk is mainly used, and no students are farther than 20 feet from the blackboard, a higher value would in general be necessary in the case of larger rooms, and on boards where it is customary to use diagrams in coloured chalk. By the kind permission of Dr. R. S. Clay, a number of experiments on this point were carried out at the Northern Polytechnic; the blackboard being illuminated with varying intensities, and the visibility of figures written in white and coloured chalks examined from various parts of the room. As a result, the Committee recommend that an illumination on the blackboard about 60 per cent. in excess of that prevailing in the rest of the room is desirable.

As a rule, it would be necessary for the illumination on the blackboard to be carried out by special local lighting from lamps equipped with opaque screens, completely concealing them from the eyes of students. The nature of the surface of the blackboard is also of importance. This should be maintained a dead-black, sensibly free from regular reflection, so that the maximum contrast between the white chalk and black board may be available; and that there may be no glare due to reflection from polished surfaces, the board should be repainted at regular intervals.

### Avoidance of Glare.

A point of special importance in connection with school-room lighting is the avoidance of glare from the sources of light; and the Committee emphasize the value of proper methods of shading. It is a common defect in schoolrooms for the bare mantles or filaments to be within the range of vision of students when looking towards the blackboard. The Committee recommend that no lamps should come within the solid angle subtended at the eye by the blackboard and a space 2 feet above it, unless they are completely screened from the eye by a shade impervious to light. In general, it is desirable that no incandescent surface should be visible to the eyes of students or teachers while carrying on their ordinary work.

Another source of glare is the direct reflection of light from the polished surfaces of the desks or paper. It would be desirable for text-books intended for young children to be printed on matt paper that is sensibly free from prejudicial reflection of this kind.

As a further means of avoiding this defect, the Committee advocate the use of shades in which the brightness of the source is spread out over a considerable area, and the judicious use of reflection from the walls and ceilings of the room. These should be of such a texture that any considerable regular reflection is avoided; glazed and shining surfaces above the dado being specially objectionable.

### Avoidance of Inconvenient Shadows.

In the class-room the lights should be so arranged that inconvenient shadows cast by the body on the desk should be as far as possible avoided. The precautions suggested under the previous heading, and particularly the use of light-tinted surroundings which serve to diffuse the light, may be recommended with a view to softening the shadow. The ceilings should be preferably of a warm white colour, and the walls and all woodwork above the dado should be light in tint.

### Conclusion.

The Committee offer the above tentative suggestions as a preliminary to more detailed recommendations. Through the courtesy of Mr. Blair and the Education Department of the London County Council, several school-rooms lighted respectively by gas and electricity have been placed at the disposal of the Committee. A number of experiments have already been conducted with a view to demonstrating to the satisfaction of the Committee that the present recommendations are practicable; and the report was finally reconsidered after the Committee had paid a visit of inspection to the rooms in question.

The wider aspects of artificial illumination and the subject of daylight illumination are being considered; and the Committee propose to report on this subject at a later stage.

* Four members of the Committee—Mr. Goodenough, Mr. Stokes (of the South Metropolitan Gas Company), Mr. Darch, and Mr. Mortimer—were strongly of opinion that the minimum illumination should not be less than 2½ foot-candles.

## Report on Library Lighting.

The Committee on Library Lighting consisted of the President, Hon. Secretary, Assistant Hon. Secretary, and several members of the Society, and seven representatives of the Library Association. The terms of reference to the Committee included both natural and artificial lighting; but they have so far confined themselves to the latter.

The first meeting was held on March 14, 1912, when a list of subjects for consideration was drawn up; and these have been subsequently discussed in detail. The Committee feel that it would not be desirable to report definitely on many of these points at present, owing to the developments constantly taking place in methods of illumination and the necessity of fuller information as to their respective merits. It was therefore decided to issue an interim report embodying the points on which agreement has so far been reached.

### Amount of Illumination Desirable.

The first question which received the Committee's notice was the amount of illumination required. A distinction should here be drawn between the conditions requisite for various classes of libraries; but the following tentative recommendations seem to have general application, and are in accordance with experience of conditions met with in a number of libraries in London.

(1) *Table, Desk, or Newspaper Stand Lighting.*—The illumination where the light is being used should in no case be less than 2 foot-candles. This value is understood to apply to reading ordinary type printed on white paper. When books printed in small type, manuscripts, or surfaces having a low reflecting power are to be studied, a higher illumination is necessary; and a tentative value of not less than 5 foot-candles is suggested.

(2) *Book-Case and Shelf-Lighting.*—A minimum vertical illumination on the case or shelf of ½ foot-candle.

(3) *General Illumination.*—A minimum of ½ foot-candle. Local illumination should be measured on the desk, slope, or table where reading is carried on. Measurements of general illumination should be made on a horizontal surface 3 ft. 3 in. above the ground. In all cases the illumination should be expressed in foot-candles.

### Avoidance of Glare, Reflection, and Shadows.

The Committee desire to emphasize the importance of adequate methods of shading, with a view to avoiding glare from illuminants such as is apt to be trying to the eyes of readers. It is proposed to deal more specifically with this point. Meantime, it is suggested that the light source—*e.g.*, the filament of an electric lamp or an incandescent gas-mantle—should not be visible to the reader.

One of the disadvantages of arranging lights close to a reader is the production of troublesome reflections from the glazed paper or from the tables. The position of lights should therefore be selected in such a manner that no rays are reflected directly off the polished surface of the paper into the eyes. It is also desirable, as a means of minimizing this defect, that the source of light should be extended over a considerable area, either by means of suitable methods of screening, or by making use of the reflection of lights from white or light-tinted walls and ceiling.

Harmful shadows—particularly those thrown by the readers themselves—should be avoided by suitable arrangement of the lights. Since sharp shadows are cast mainly by direct rays from sources of light of small area, the desirability of making judicious use of the reflection from light-tinted surroundings is indicated. In general, it is preferable to avoid materials which are very dark in colour and absorb a great deal of light. Shadows are apt to be cast by the heads of readers examining shelves. With a view to avoiding this, local shelf lighting by well-shaded lamps is sometimes desirable.

### Conclusion.

The Committee do not at present desire to recommend definitely any particular system of lighting for libraries, recognizing that the purpose for which the library is intended—*e.g.*, whether as a reference library, for casual reading, or for lending books, &c.—must be considered. Local lighting and general lighting have both their respective merits; but a combination of the two methods is generally most advantageous. The comparative advantages of direct, indirect, and semi-indirect lighting are being considered; and the question of the best means of illuminating racks and shelves is also receiving attention.

# MODERN BOILER SYSTEMS AND THEIR WORKING.

The following is an abstract translation of a paper read before the German Association, at their recent meeting in Strassburg, by Herr GÖHRUM, of Stuttgart.

In his introductory remarks the author speaks of the way in which industrial improvements are generally forthcoming when there is need for them, and the need often consists in keeping pace with the competition of another branch of industry—as illustrated by the tremendous advance of the gas industry since the development of electricity. Of the same nature was the sudden advance of the steam-engine on the introduction of combustion motors, and the gradual evolution of the highly efficient steam-turbine, after the steam industry had been comparatively stagnant for some years. With the advance of the steam-engine, advances in steam production likewise became necessary, and improvements of late years have been general—in construction, firing, economizers, &c.

## Boiler Systems.

The paper then proceeds to describe the various forms taken by modern boilers. Passing rapidly over the primitive form of simple cylindrical boiler (now no longer installed owing to its low efficiency), the paper deals with the most common form used at the present time—with one, two, or three tubes or flues of suitable diameter running from end to end, which are all heated by the combustion gases. The ordinary steam production of this type is 3·3 lbs. per square foot of heating surface; and with three tubes, 5·1 lbs. per square foot. Boilers with three combustion tubes are made with heating surface up to 2150 square feet, with two tubes from 540 to 1600 square feet, and with one tube from 215 to 540 square feet. These tubes or flues provide effective heating surface, and, owing to the internal firing, loss from radiation is small. They produce dry steam, and labour and maintenance costs are low. But the water circulation is bad, and if the water-level is allowed to get low, so that the tubes are not covered properly, they are very apt to bulge, and there is then a danger of explosion. Another modern type of boiler is that in which the tubes just described are replaced by a large number of tubes of smaller diameter. In this way heating surfaces of 270 to 1600 square feet are obtained, with steam production of 3·3 lbs. per square foot. By this system a large heating surface can be worked on small ground space. The boilers can be heated up very quickly, but the tubes are apt to become leaky and are sensitive to impurities in the water. Moreover, the steam production is so rapid that the steam is rather damp. Altogether the system has so much against it that it has been little adopted for stationary boilers.

A combination of these two systems in a double boiler has received a certain amount of favour. An ordinary Cornish or Lancashire boiler is joined by two connections to a boiler of the other type described, which is placed above it. In order to ensure a good circulation of water, generally only the top boiler, into which the feed-water is introduced, contains any steam-space. The chief advantage of the system is the high steam production per unit of heating surface, and the complete using up of fuel. It gives wet steam and needs pure water; but these disadvantages do not count for much in modern working, as, for other reasons also, it is customary to have filter and superheating plant. A combination boiler of this kind erected for the Chemnitz Electricity Works has a heating surface of over 7700 square feet. The steam is at a pressure of 13 atmospheres, and is superheated to 400° C. The production of steam per hour is 26,400 lbs., and the efficiency is 80 per cent. Yet another type is the water-tube boiler, in which small tubes, such as the heating tubes already described, are connected at each end with water tanks, and the water running through them is heated externally by hot gases. The variety in the details of this system is great, and they are not dwelt on in the paper. The water circulation in this system is good, and also the fuel consumption; and as much as 5·12 lbs. of steam are produced per square foot of heating surface. The demand for increased efficiency per unit of heating surface and ground space has led to the introduction of varieties of this system with almost vertical tubes. By the latest improvements in detail—especially of water circulation and taking off of steam bubbles—as much as 8·2 to 10·2 lbs. of steam can be raised per square foot of heating surface, with an efficiency of 80 per cent. Instead of being bricked-in, these boilers can now be mounted in a wrought-iron casing, with an insulation of sheets of material of low conductivity. With the gradual development of boilers, the production of steam per square foot of ground space has increased from 5·4 lbs. to 44·5 lbs.—about eight-fold. Even this figure seems to be eclipsed by the surface combustion boiler.

## Firing, Superheating, Economizers, and Forced Draught.

Improvements in firing have contributed in no small measure to the increased efficiency of boilers. Mechanical appliances have replaced the hand-stoker, who could not possibly satisfy the demands of over 5000 square feet of heating surface. Plane grates have therefore been replaced by projector firing for ordinary boilers, and chain grates for water-tube boilers. The M'Lean system is recommended for use with poor-quality fuel or fuel of small dimensions (especially coke dust), as it works with self-regulating draught according to the steam pressure. Owing to the rise in coal prices the last few years, and the comparative drop in tar prices, the use of tar as boiler fuel—of especial advantage to gas-works—has increased considerably, and tests have shown that it compares very favourably with other fuels as regards cost, even when its price is fairly high.

Modern superheaters are made of wrought iron, and in the form of coils, and are built into the boiler flues. The degree of superheating depends on the pressure of the boiler, and in order to keep it constant, dampers were at one time introduced into the flues. But these did not prove durable, and now it is customary to mix the superheated steam with more or less damp steam, or to cool it to the required temperature in the feed water.

The constant striving after economy has led to the utilization of the waste gases for preheating the feed water. The surface of these economizers is less expensive than boiler surface. The waste gases are allowed to pass from the boiler at a temperature of about 150° C. above the temperature of the water in the boiler. The heating space of the preheater or economizer is so regulated that the feed water is raised some 80° C. in temperature. For coal or coke firing, it may be assumed that the waste gases lose 2° to 3° for each degree they raise the feed water, so that anything up to 15 per cent. should be saved on the fuel bill, besides which there are many other advantages in working. A steam production of 4410 lbs. per hour may be taken as the lowest case where it is economical to use an economizer, but this rule is necessarily subject to variations. Wrought iron is most commonly used, though, as a matter of fact, cast-iron pipes would be quite as durable, as they do not sweat if the water enters at a temperature of 50°. With its cheapness and efficiency, cast iron will there is no doubt be the material for the construction of the economizer of the future. These preheaters are only built singly, and always directly on to the boiler.

The exhaustive utilization of the heat of waste gases, the increasing size of boilers and boiler houses, and the attention paid to landscapes in planning buildings have all influenced the size of chimneys. When waste gases are cooled down to 150° C. and lower, very high and expensive chimneys are needed. These can, however, be obviated by the use of artificial forced draughts, which also help to increase the rate of production of steam. Air is blown into a tube, which takes the place of the chimney, and the waste gases are drawn through it after the style of an injector. The force of the draught can be regulated by various means. Only ½ to 2 per cent. of the power produced by the boiler is required to work the forced draught.

## Feed-Water and General Control.

Modern boilers possess the disadvantage of great sensitiveness to impurities in the water used, and good working can only be assured by having a reliable filtering arrangement. The lime-soda process has the drawback of giving varying results with varying composition of feed-water. A powerful competitor is the Permutit process. Permutit is a basic aluminium silicate, which gives up soda in exchange for lime. So the water leaving the filter contains sodium sulphate, which, being readily soluble in water, forms no scales. When the soda is all used up, a sodium solution is passed through the filter, and the lime is again given up in exchange for soda, and the filter thus regenerated. Both these processes necessitate letting-down the boiler from time to time to clean out deposits of salts. There is a pure soda process called "Neckar," which constantly draws the sludge from the bottom of the boiler and takes it to the filter, thus raising the water at the same time to the requisite temperature for soda purification. A boiler at the Stuttgart Gas-Works has been working satisfactorily on this system for three years. But with hard water and modern high efficiency boilers thorough filtration must be effected outside the boiler.

In recent times injectors have been largely supplanted by direct-acting steam-pumps—the latter being much more economical. Owing to the danger of damage to the boiler, or even of an explosion occurring, if the supply of feed-water goes too low, various automatic devices have been invented for giving the alarm. It is only questionable whether they are sufficiently reliable to trust completely, as they are certain to make the workmen wanting in vigilance. The author finally recommends that the working of boiler plant should be very carefully controlled by measurements of fuel, of combustion, and of feed-water used. For the fuel, he suggests some automatic weighing machine in the conveying plant; for control of the combustion, some system of automatic flue-gas tester; and sundry devices for weighing or measuring water are well known.

## Conclusion.

In conclusion, the author remarks that cheap steam must be the foremost aim in laying out plant. The price of steam depends mainly on cost of fuel, capital outlay, and labour costs. Attention should always be given to cheap fuel, which often pays best in the long run. The kind of fuel to be used often influences the choice of the whole plant, especially the parts connected with firing and fuel-handling. Other considerations in the selection of a system are the amount of steam required, the nature of its application, and the cost of ground space. Once more calling attention to the great development of steam technique in competition with combustion engines, the author asks if the next stage of the advance is to be flameless combustion.

# CORRESPONDENCE.

*[We are not responsible for opinions expressed by Correspondents.]*

## The Testing of Gas-Fires.

SIR,—May I ask your kind indulgence for making one or two remarks on the letter which appeared in the "JOURNAL" of the 8th inst. from Professor Bone, commenting upon an article which appeared under my name in your issue of July 1.

In the first place, I would say that I yield to no one in my admiration for the exceedingly valuable work done at Leeds University, and commencing about the time stated by Professor Bone. The work done led to a very healthy reconsideration of the problems of gas-heating; and the lines which were laid down have been very generally followed.

You will forgive me, first of all, for referring briefly to the manner in which this discussion arose. I understood that the point originally under discussion was the hygienic merit of a certain fire, which was called in question by another maker; and it is interesting to note that Professor Bone [presumably in his "fiduciary position"—see "JOURNAL" for May 27, p 601, letter from Mr. H. James Yates], while he accepts the total heating efficiency tests published by me, apparently cannot dispute the results of tests of the hygienic efficiency of the fires, which are of at least equal importance. As pointed out by you in your editorial [p. 578, May 27], many people "prefer to forfeit, if necessary, a little radiant efficiency to obtain the fullest possible assurance of hygienic efficiency." I have always felt that this point has been wrongly treated as of secondary importance to the radiant efficiency obtained from fires; and I accordingly welcome the campaign which Messrs. Davis instituted, directing attention to this other aspect of the fire question.

Professor Bone apparently does not consider the radiometer described as being a trustworthy instrument; but I was careful to point out the reasons for its adoption, in the hope that the apparatus might be of interest to all practical men who had to deal with the testing of gas-fires. My experience is that the testing of gas-fires is largely comparative; and it appears to me reasonable to suggest that there is no reason why there should not be distinct differences in the construction of testing apparatus suitable for practical everyday use and the more elaborate laboratory instruments suitable for purely research work, which possibly involve many calculations. From the manufacturer's point of view, the time occupied in making the tests is a very great consideration.

With regard to Professor Bone's reference to the Leeds test being accepted as a standard, we have recognized this as the only generally accepted test, and have adopted it as a standard. We have, however, of necessity, employed the "empirical factor" to bring the readings of our new radiometer into line with the Leeds apparatus; although the accuracy of this latter instrument, in indicating the total heat radiated to the inner surface of the imaginary hemisphere, might be called into question. I can only say that, with regard to the tests for radiant efficiency appearing on p. 26 of the "JOURNAL" for July 1, a test by the Leeds method was taken before the first reading by our radiometer, and again immediately after the last test; and, when the results were compared, we found that the radiometer reading obtained [employing the so-called "empirical factor"] exactly corresponded with the reading obtained by the Leeds test. I do not think it is altogether unjustifiable to assume that, if the two tests gave equal results at each end of the tables, then the intermediate readings were approximately correct. I would further point out that in the Leeds test itself the instrument has to be standardized by taking a radiometer reading on a plane surface in one position only; while the construction of this (Professor Hughes's) radiometer itself is of such a nature as to leave open to question the accuracy of the assumption that the readings given apply correctly to the area for which the test is assumed to be taken.

In conclusion, I would point out that Professor Bone indicates that the Leeds test was adopted by a Committee representing Science and Industry. I venture to say that while the "Science" side is very ably represented on this Committee by Dr. Drugman and Professor Stroud, whose disinterestedness no one can dispute, "Industry" has little or no representation. I think that Professor Bone will admit that even his claim to represent the industrial side is of a more recent date.

*Gothic Works, Edmonton, July* 11, 1913. THOMAS GLOVER.

## Hygienic and Heating Efficiencies of Gas-Fires.

SIR,—We have read with interest Professor Bone's communication in the "JOURNAL" for the 8th inst., and we are in agreement with him in thinking that very great credit and the thanks of the industry are due to Dr. Drugman for the exact and painstaking investigation into the tests methods finally adopted by the Gas-Heating Research Committee. But we cannot agree with Professor Bone's criticism of the calorimetric method of testing the radiant efficiency of gas-fires; and as his letter appears to be communicated with the primary object of discrediting this method, we feel justified in offering a few observations, although we have, for the time being, placed our case unreservedly in the hands of Mr. Butterfield for independent investigation.

After almost daily experience with the use of the calorimetric method of testing gas-fires, extending over a period of some five years, we are firmly convinced that by this method thoroughly reliable comparative results can be obtained as to the relative radiant duties of various gas-fires; and if a careful comparison is made with a suitable standard, a correction can be arrived at which will give the total radiant efficiency of the fire under test. The factor 1·3, as given by Mr. Glover, does not appear to be far from correct; but there are reasons to doubt the value of his figures for the total of radiant efficiency. We are, by calorimetric methods, capable of obtaining totally different comparative results.

In the concluding paragraph of his letter, Professor Bone says that Mr. Glover's article seems to prove *only* that a 10-inch "Talisman" fire has a greater room-heating efficiency and a smaller flue heat loss than a 10-inch Davis "Apollo." It will, of course, be apparent to all that the statement of one of these conclusions is a statement of the other, as the total heating value is the total heat generated *minus* the heat lost by way of the flue outlet; and in the same way the flue heat loss is the total heat generated *minus* the total heat passed into the room.

We cannot in any way agree with this conclusion, as Mr. Glover's article proves other interesting points, before detailing which we should like to quote again the statement that gave rise to this controversy, which was published in the "JOURNAL" on Sept. 3, 1912, and was as follows:

> A fire, for instance, that carries off all its products without being attached to a flue will, the firm [John Wright and Co.] submits, when the ordinary chimney draught comes into play, "inevitably carry off more than the products—to wit, an unnecessary number of heat units as well; and a lowered room-heating efficiency is the result."

Now, Mr. Glover has ascertained that the 10-inch "Talisman" fire requires 57 inches of flue-pipe to ensure the removal of the products by way of the flue outlet. On the other hand, both Mr. Butterfield and Professor Bone have shown that the 10-inch "Apollo" fire is capable of removing, and does remove, the whole of its products by way of the flue outlet, unaided by chimney draughts. As no fire can be considered to be complete unless it is removing the whole of its products by way of the flue outlet, it would be useless to compare the 10-inch "Apollo" fire and 13 inches of flue-pipe with a 10-inch "Talisman" with a similar length; and it becomes necessary to draw a comparison between the "Apollo" fire and 13 inches of flue-pipe and the 10-inch "Talisman" fire and 57 inches of flue-pipe, in which case each fire will be removing the whole of its products by way of the flue outlet. In this case, it is shown by Mr. Glover's figures that the total room-heating efficiency of the Davis fire is 68·9 per cent.; whereas that of the 10-inch "Talisman" is only 68·1 per cent.—showing that the room-heating efficiency of the Davis fire is greater than that of the 10-inch "Talisman," though the Davis fire has attached to the flue outlet 13 inches of unnecessary flue-pipe. If we add to the "Talisman" fire 13 inches of flue-pipe in addition to the 57 inches required to effect the removal of the products, we get a total of 70 inches of flue-pipe; and we now have each fire with 13 inches more flue-pipe than is required to remove all the products by way of the flue outlet. On setting out a curve showing the flue heat losses from the "Talisman" fire with various lengths of flue-pipe, we find that with 70 inches of pipe its total room-heating efficiency is approximately 65·7 per cent.; whereas the "Apollo," with 13 inches of flue-pipe, has a total heating efficiency of 68·9 per cent.—being no less than 3·2 per cent. greater than that of the "Talisman" fire.

Further than this, Mr. Glover's figures show that the chimney draught increases the flue gas losses in the 10-inch "Talisman" fire more than it does in the case of the 10-inch Davis fire. By increasing the flue-pipe attached to the "Talisman" fire from 13 to 80 inches, the flue gas loss has been raised from 25·6 to 35 per cent.—an increase of 9·4 per cent.; whereas a similar increase in the length of flue-pipe attached to the "Apollo" fire only increases the percentage of heating passing to the flue outlet by 6·4 per cent.—showing that the increased flue loss due to the influence of flue draught in the case of the "Talisman" fire is nearly 50 per cent. greater than that in the case of the Davis fire.

These figures, we contend, show conclusively the inaccuracy of the statement quoted from the "JOURNAL" of Sept. 3, 1912. Moreover, they prove that the flue losses of the Davis fire, which is capable of passing the whole of its products to the flue outlet unaided by flue-pipe, are not so much increased by the addition of 67 inches of flue-pipe as is the case when this length of pipe is added to the flue outlet of the 10-inch "Talisman" fire of Messrs. John Wright and Co.

In conclusion, we would thank Mr. Glover for the very interesting article which he has contributed to this discussion. It is a source of great satisfaction to us that he, as a disinterested party, conclusively shows the injustice of Messrs. John Wright and Co.'s statement as quoted above.

*Queen Victoria Street, E.C., July* 11, 1913. DAVIS GAS-STOVE COMPANY, LIMITED.

## The Gas Exhibition and the Society of British Gas Industries.

SIR,—We thank you for publishing our letter of the 5th inst., but we do not quite understand your comment thereon.

In our letter we stated that the remarks in your issue of the 1st inst. convey to every reader you may have, this inference: That the Helm Lamp Company was precluded from becoming a member of the "B.G.I." because it was not a properly qualified firm, and because it does not hold a recognized place in the gas industry. We challenge anybody with a knowledge of English to put a different interpretation on it. We are not accustomed to twist truth or distort fact.

Although we have drawn your attention to this matter, you have not seen well to refute definitely this interpretation.

Were not the "B.G.I." given a special privilege in regard to this exhibition—a privilege for which they have paid in pounds sterling—the matter we have raised in your columns would be out of place, because of its individual character. We submit that the principles which are clearly set out in our letter of the 5th inst. make the issues concerned of the very first importance to the whole industry.

As your comments proved, you considered our first letter of such consequence that you very rightly took steps to obtain official information in regard to it; and so satisfied were you with what you were told, that you couched your reference to our letter in such a manner as to be a direct reflection on this firm—thinking, no doubt, that the stand you took was in every way a right and proper one.

Now, however, that we have had an opportunity of putting before you and—through your own courtesy—your readers, in no ambiguous terms, the actual issues, you apparently do not think it necessary to pass any judgment that would affect your previous attitude. The only reason we can attribute to your action is that you do not wish to speak in our favour.

Although we write this, we cannot believe that we can be judging

you fairly; but this we do know—namely, that by telling you frankly how we judge you, we give you the opportunity of correcting us. It is not necessary for us to remind you that the strong man is the man who can admit that he is in the wrong.

We do not, and cannot allow this matter to rest where it is, because the whole attitude of yourself and the "B.G.I." is a slur on our firm. We know we have the support of many prominent members of the "B.G I.;" but it ought not to be necessary for us to take steps in other directions to obtain that redress which the action of the "B.G.I." and your comments call for.

So much for the reflections on us. In regard to another issue, you say "the Institution of Gas Engineers and the British Commercial Gas Association obviously cannot sit in judgment upon the Council of the Society of British Gas Industries, in regard to any individual case of application for membership." If the gas industry, as represented by the Institution of Gas Engineers and the British Commercial Gas Association, after having entered into a compact with the Society of British Gas Industries (tantamount to acknowledging it as representing the trading side of the gas industry) cannot call upon this trading Society to account for its action in regard to "any duly qualified firm holding a recognized place in the gas industry," how long will the Societies named be allowed to exist as representative of the gas industry? The very idea of representation is protection.

Whatever objection the "B.G.I." has against a firm, surely it can be stated when that firm courts and asks for publicity!

Do, please, think over the position again. We are so confident in our own right that we feel sure you, who know so well the results that follow the application of wrong principles, must be on our side.

As we have said, we have already received much support from members of the "B.G.I." who do not agree with their Council's action. We are by no means alone, and your attitude is being watched by the whole industry.

HELM LAMP COMPANY,
per WM. BUTLER, Managing-Director.

*Nuneaton, July* 12, 1913.

[Having complied with our correspondents' request to "think over the position again," we refer readers to the editorial note appended to the letter in last week's issue. As then intimated, we are not in the confidence of the Council of the Society of British Gas Industries regarding their action in the matter of any specific application for membership. When our correspondents can learn from the Council the cause or causes for their decision in respect of the application which we understand from the Company's letters they made, we shall be happy to give the cause or causes publicity, and to express an opinion as to their validity, sufficiency, and fairness.—ED. J.G.L.]

## Silica Material for Retort-Settings.

SIR,—Following the report of the Refractory Materials Committee to the Institution of Gas Engineers in 1912, Mr. Randall, of Waltham Abbey, who was then working at 2400° Fahr. (1320° C.) in combustion chambers and 2000° Fahr. (1100° C.) in retorts, with the object of obtaining 14,000 cubic of gas per ton, related his experience of the fire-clay material supplied to him—characterizing it as "disastrous." After other gentlemen had spoken, the President closed the discussion by stating that "all looked forward to a greater gas yield when a suitable material is found."

This year, Mr. Randall states he has obtained 15,000 cubic feet (incidentally burning-down his settings in doing so), and is intent on getting 16,000 feet "if he can obtain a better material from the retort manufacturers." Mr. Bywater, in reply, says "that is the *crux* of the whole thing; Mr. Randall cannot get anyone to supply it. Where are you going to obtain the material?" I now propose to answer this question.

Herr E. Körting and Mr. R. M. Searle, of Rochester, U.S.A., indicated silica material as solving the problem—stating that in the United States "astonishing results" have been obtained. "The work that silica does, and the improvement in the material itself is so marvellous in its effects on the quality of the gas, as well as the amount produced, that it is worthy of consideration here."

This being the case, it will doubtless be of interest to the gas profession to consider the advantages and what disadvantages, if any, attend the use as a refractory of the silica material obtainable.

Speaking at the meeting of 1908 at which Mr. Bywater's able paper on refractories was read, Mr. Thomas Glover, of Norwich, said "the three things they wanted to avoid were fusion, expansion, and contraction." He might also have added cracking and flaking-off.

Lime-silica products of good quality are (with occasional exceptions) immune from fusion in settings; but they expand considerably *in situ*, and they crack into pieces or flake-off very readily under sudden changes of temperature, cold air-currents, &c.

Mr. Bywater, in his paper referred to, gives the constituents "which have been found" by analysis in Dinas rock and black ganister. But much, if not all, of the ganister used at the present time may safely be said to fall short of the quality indicated. He goes on to describe the ordinary process of manufacture, into which I do not propose to enter further than is necessary to elucidate the basis of it.

It is well known that lime (CaO) combines avidly with fine particles of silica ($SiO_2$) at about 1100° C., forming a silicate of lime, if the silica be pure. In practice, however, it is always more or less complex in character, as the silica is more or less impure. As a rule, the $SiO_2$ is contaminated with other oxides—such as those of alumina, iron, lime, magnesia, potash, and soda; and the greater the number of these oxides present, the more complex and fusible does the silicate become. No one knows absolutely what happens chemically when such material is subjected to high temperatures. But we all know that, if the heat and conditions are intense enough, and long continued, vitrification is induced; and then destruction of the bricks or goods occurs. CaO is, therefore, by no means the most desirable addition to make to silica aggregates—particularly if the latter be impure. However, the lime-silica brick is generally safe from fusion in settings.

Expansion is the next feature to be considered. All lime-silica products expand on further heating *in situ*, more or less—generally more, as is apparent from the limit fixed by the specification. Mr. Bywater says that Welsh Dinas, though kiln-fired to 2600° Fahr. (say, 1410° C.) "expands further on subsequent heating;" also that "ganister bricks show expansion on heating up," and that "they must be heated-up and cooled-down very gradually and kept quite dry." He is quoting from the manufacturers' instructions, which are quite correct.

To prevent cracking and flaking under sudden changes of temperature, "they must be heated-up and cooled-down very slowly." But the Committee say that "there is sometimes a fall of over 1000° Fahr. when a retort is charged." Clearly no lime-silica product will stand this on the maker's own statement. But there is a new form of silica product which is absolutely free from each and every undesirable feature of lime-silica, and which it is believed will eventually cause as great a revolution as vertical retorts.

Neither lime nor any salt of lime is employed in the process of manufacture of this product, for which it is claimed—and the claims are supported by testimony—that:

(*a*) It does not appreciably lower the fire stability of the aggregate manufactured.

(*b*) The products have no further appreciable expansion *in situ*.

(*c*) They are practically immune from cracking or flaking under sudden changes of temperature.

(*a*) An impure silica was recently analyzed by Dr. Mellor, and tested for fusion point. He found it contained 2 per cent. of alkaline oxides, and 34 per cent. of CaO and MgO; and that its fire stability was 1740° C. He then tested brick made therefrom by the new process, and found its stability lay between 1720° and 1730° C.—proving no appreciable diminution of fire stability. Another expert gives 1750° C. as the fire stability of the manufactured product, with 0·72 $K_2O$ and 0·22 MgO in the aggregate.

(*b*) Dr. Mellor found the expansion under the specification test to be 0 16 per cent. in this case. Some other tests of brick made from other silica by the new process have given results as low as 0·075 per cent. expansion.

(*c*) Many tests of extreme severity have been made, which substantiate this claim. The writer made a test with two segmental retort-bricks—one of a well-known brand, the other made from an inferior, impure silica by the new process, with very remarkable results. Each was subjected to identical treatment in the flue of a furnace in which high temperatures—from 1750° to 1800° C.—were generated by day (the fire burning out at night), each consecutive 24 hours. In six days, the well-known brick had gone to pieces, and as a whole was badly affected by the escaping gases. The brick made from silica by the new process remained in position and intact for twelve weeks; and when removed it was found but little affected by the gases.

The analysis of these bricks made in the laboratory of a large gas-works gave 94 per cent. $SiO_2$; and the engineer said that they stood in arches of the combustion chambers as well as the best silica bricks obtainable.

From the brick which failed, they obtained a satisfactory life in the built-up retorts. Inferentially, therefore, retorts built up of the new material would yield a much longer life, and (judged by Mr. Searle's statements) very much better results in quantity and quality of gas.

*Verb. sap.*

C. E.

*July* 9, 1913.

## Körting on Gasholders.

SIR,—Your article this week bearing the above title cannot be passed over without comment in so far as it refers to shallow-lift holders.

The true reason for the shallowness of the tank for the 12-million cubic feet holder at East Greenwich is not given in your article. It was practically impossible to make it deeper; and as the depth of the lifts must correspond with the depth of the tank, they were of necessity shallow.

Sir George Livesey, who, after the tank had been built, called me in to advise on the proposed construction of the holder, told me it was "Hobson's choice." He said he could not make the tank deeper, as he found to do so meant "pumping the Thames dry." So he stopped short, at about 13 feet, and then banked it up another 21 feet, so as to get the 30 feet effective depth.

No one in his senses would dream of putting in a gasholder having the proportion of depth to diameter of 1 to 10, if he could avoid it. And as for Mr. Herring, or anyone else, saying that the "*paramount object* of constructing gasholders with *shallow lifts* is to *ensure the level ascending and descending of the inner lift when it is working alone*," it is ridiculous, and most dangerous advice—enough, indeed, to make our German friends laugh us to scorn.

When Sir George Livesey consulted me on the stresses in the twelve million holder, we fully realized that it would be extremely difficult to maintain such a shallow lift "level" in rising or falling when uncupped. The very reverse, therefore, of what Mr. Herring is reported to advocate is the truth.

Stability before cupping makes it essential that the diameter of the inner lift should not exceed seven times its depth—particularly if steady guiding is to be ensured with anything approaching economy. This is the most elementary truth in gasholder construction; and I am surprised that Mr. Herring should promulgate any such doctrine as the opposite—if, indeed, he has done so.

After a shallow inner lift has cupped, it will be all right; but my advice to East Greenwich, or any other place that has a shallow inner lift, such as one-tenth of the diameter in depth, and guided in the ordinary way, is not to uncup it unless absolutely obliged. Use it simply as a stand-by. If Sir George Livesey were alive now, I am sure he would not only agree with me, but he would be the first to denounce any such fallacy as that which is now advanced. It is simply the resuscitation of the "six feet of guide framing" theory in another guise.

Finally, if Mr. Herring will consult my book on the "Guide Framing

of Gasholders," he will find the reasons clearly demonstrated for a very shallow lift being inadmissible under ordinary circumstances.

*Westminster, July* 9, 1913. F. S. CRIPPS.

[Our correspondent says that "stability before cupping makes it essential that the diameter of the inner lift *should not exceed seven times its depth*." In last week's article, it was pointed out that the Granton holder, about which Mr. Herring was speaking, bore the proportion of 1 inch depth to 7 inches in diameter; and Mr. Herring refers to this as a "shallow tank," as against the old proportions of 1 to 4 or 5. The inner lift of the Granton holder is 1 to 6·7; so that it comes well within Mr. Cripps's rule. In his book describing the Granton Gas-Works, Mr. Herring shows conclusively that he would not go to the length of 1 to 10; and, at the same time, he mentions that Sir George Livesey said in 1902 "that he would never put up a 1 to 10 holder if he could help it." It was in regard to the Granton holder, with its 1 to 6·7 inner lift, that Mr. Herring wrote:

> "The principal object in the construction of gasholders with shallow lifts is to ensure the level ascending and descending of the inner lift when it is working alone. The inner lift—which has to withstand the stress of the dome or crown, and also to carry the entire weight of the lower lifts—is of necessity stronger itself than its neighbouring lifts; and it is only a matter of keeping the framing of the upper lift in form during ascent and descent when uncupped, that must be achieved in order to ensure success."

It seems to us that Mr. Cripps has misunderstood what Mr. Herring regards as a "shallow lift." On the other hand, Mr. Herring's practice does not convict him of ignorance of "the most elementary truth." ED. J. G. L.]

## Signor Pacchioni's Paper on the Feld Process.

SIR,—In the June numbers of the "JOURNAL" appeared, on pp. 808 and 1005, an article by Signor A. Pacchioni. It is not my intention to criticize his report; but there are three points on which I should like to submit a correction.

The first is the statement on p. 1005 (paragraph 6), that, in order to absorb the excess of sulphuretted hydrogen over what is equivalent to the ammonia in the gas, it would be necessary to utilize the same ammonia over and over again.

The thionate process not only guarantees complete absorption of ammonia, quite independently of the temperature of the gas, but (as I shall very shortly be in a position to prove on a large scale) so complete, at the same time, is the extraction of sulphuretted hydrogen that gas-works are enabled to reduce their purifiers to one-fifth or even to one-tenth of their present size.

This is quite in accordance with Signor Pacchioni's statement on p. 1005 (paragraph 7), where he mentions the experiments made in his presence with gas containing about 18 grammes of sulphuretted hydrogen per cubic metre, and completely free of ammonia. In this experiment, I proved that it was easy to absorb by a proper polythionate solution as much as 89 per cent. of the sulphuretted hydrogen, and reduce it to pure sulphur, without using any material extraneous to the gas.

The plant in Königsberg, which has now been in full operation for over two years, and in which we have during that time treated the entire production of gas, amounting to 45,000 cubic metres per day in summer and 90,000 cubic metres in winter, is in fact more or less a provisional plant. I do not mean provisional in the sense of capacity or efficiency, but only in so far as we were hampered by the necessity of utilizing buildings already existing and of accommodating ourselves to existing arrangements. Nevertheless the results have been from the very first day so satisfactory that the Municipality have decided to order an extension of the plant with a capacity of 150,000 cubic metres of gas per day.

Even on first starting the plant, in June, 1911, we were able to extract three times as much sulphuretted hydrogen from the gas as corresponded to the ammonia present. As, however, the provisional plant could not be erected in the proper shape for this purpose, we could not continue this way of running the process, and had to satisfy ourselves with the complete extraction of ammonia. The reason for this will appear as soon as the results of the new plant now under construction are published.

The second point upon which I must qualify Signor Pacchioni's statement is the question of chemical control. Here I agree with Signor Pacchioni in so far as I do not intend to recommend the thionate process to gas-works with a capacity of less than 10,000 cubic metres (350,000 cubic feet) per day. My point, however, is that for gas-works of larger capacity, which will in any case require chemical control, the necessity of such control will be no greater with this new process than with the older one. In fact, it will be less, inasmuch as the new process is quite independent of the temperature of the gas, and is far more regular than the old. With the old process, the amount of ammonia extracted not only depends on the temperature of the gas and water, but also on the carefulness of the workmen and—a very important point—on the quality of the gas and the gas treatment preceding the ammonia extraction. It is well known that the amount of tar and naphthalene in the gas greatly interferes with the effectiveness of the ammonia extraction by water. In fact, the ammonia lost in the gas with the old water process varies from 5 to even 50 grammes per 100 cubic metres, whereas with the new process 2 grammes per 100 cubic metres will be considered a normal figure. The ammonia extraction at the Königsberg Gas-Works has from the beginning been satisfactory, although the gases we had to deal with have very often contained considerable amounts of tar, naphthalene, and cyanogen. Although there is a standard washer of the Bueb type in operation, the extraction of cyanogen is less than 75 per cent., and often does not exceed 50 per cent.

From the very beginning of operations at Königsberg, for the night shift we were able to run with a single man, and without the control of a chemist. Gas men very often point to the fact that the chemical reactions on which my process is based are very complicated. This may be so; but the working is simple—simpler even than that of the old process. It is true I do not recommend that the plant should be run by a simple foreman, who has no idea whatever of chemistry; but those who point to the complicated reactions of this new process I usually ask: "Can you tell me the chemical actions of the iron oxide in the purifier boxes on the sulphuretted hydrogen, and of the air on spent oxide?" None of them will venture an answer to this question, or attempt any explanation of these highly complicated reactions; nor would I do so. Yet that is a process that has been in use in gas-works for nearly a century.

The third point on which I do not agree with Signor Pacchioni is his assertion that the Feld thionate process is not more economical than the process of the direct sulphatation, and his proposition that even small gas-works could economically use direct sulphatation.

As to the last statement, I do not think it would be advisable for gas-works with a capacity of less than 10,000 cubic metres (350,000 cubic feet) per day to adopt the process.

As to the first statement I must make some preliminary explanations. When I started with my experiments on gas treatment, it was with the object of doing away with the weak ammoniacal liquors. I was the first to propose the hot tar extraction for this purpose. The Feld tar-washer has proved very satisfactory for hot tar extraction; and this at temperatures even above 90° C. Of course, it must be well understood that at such a temperature only such tar products as are already condensed can be eliminated from the gases. Tar is a mixture of liquid and solid hydrocarbons with "pitch," which latter we may characterize as undefined coal products of high melting and boiling point. In gases with a temperature of 120° C., the pitch products are already condensed and form a very fine mist of finely divided drops of pitch. The lowest boiling point of pitch extracted at 120° C. is between 300° and 320° C., according to the quality of the gas.

After the pitch has been completely extracted, the gas does not contain any more pitch. What is left are "tar-oils."

Of course, for existing gas-works such temperatures as 120° C. for gas treatment are out of question, as long as gas-works do not part with the hydraulic main. So we have only to consider tar extraction at the temperature at which the gas leaves the main. This is the dew-point of water saturation. For gas-works, we may consider the average dew-point to be 60° to 65° C. The tar products condensed at this temperature, according to my experience, have a lowest boiling point of about 250° C. The gases leaving the Feld washer at 60° to 65° C. are, of course, saturated with vapours of tar-oils, with boiling points of 250° C. and above; and besides they contain vapours of all tar products with lower boiling points.

At a French coke-works at Pas de Calais, we have for two years been running two tar-washers with such an efficiency that the gases leaving the washer contain only 1·3 grammes of tar per 100 cubic metres of gas. This hot tar extraction, before the gases are cooled under the dew-point of water saturation, is necessary, in order to avoid condensation of ammonia water.

After I had practically proved that tar extraction is possible at such high temperatures, others followed my example; and then they tried to extract the ammonia from the hot gases by sulphuric acid. All these processes with hot tar extraction proved to be failures, and this for different reasons. First and mainly, the means they applied for hot tar extraction were unsatisfactory. Another important reason they overlooked was the following fact: As stated above, the gases coming from such a good tar-extractor as the Feld is, are saturated with tar products of boiling points of 250° C. and above. If such gases are treated with sulphuric acid solutions of sulphate of ammonia, the free sulphuric acid acts on the tar products, which by this action are condensed in the form of resinous products. Furthermore, the fixed ammonium salts contained in the gas—mainly chlorides—are decomposed; and the free hydrochloric acid acts on the apparatus, eating any metal in a short time. For this reason, Koppers first separates the tar and the fixed ammonium salts from the gas by cooling it. He then reheats it before treating it with sulphuric acid. This is the general and only successful way for direct sulphatation; and Koppers' competitors have all followed this way—first applied by him. If applied to lighting gases, this process consists generally in the following operations:

1. Cooling in surface coolers from 65° C. to about 25° C.
2. Tar extraction by a Pelouze apparatus.
3. Reheating from 25° C. to 45° C. or above.
4. Sulphatation.
5. Extraction of acid vapours.
6. Recooling to about 25° C.
7. Passing exhauster.
8. Purification.

With the Feld thionate process, however, the gases pass directly at the high temperature from the tar-extractor into the ammonia-extractor; and, working for more than six months with a Feld tar-washer at temperatures of 60° to 65° C., no difficulty has presented itself in doing this, either from contamination of the thionate liquor or otherwise, in consequence of any condensation of tarry products.

The extraction of ammonia is complete. The gases, leaving the ammonia washer at the temperature at which they entered the tar-washer, are then cooled. As the gases do not contain any product soluble in water, this cooling is done in a Feld cooling washer in direct contact with the cooling water. In this washer, the cooling is completed with 5 litres of water per cubic metre (33⅓ gallons of water per 1000 cubic feet) of gas, or only 10 per cent. more than the amount theoretically necessary.

With the direct sulphatation process, the gases are cooled in surface coolers, the efficiency of which is so low that about 12 litres of water are necessary per cubic metre of gas.

To this requirement of water must be added that for the recooling from 45° to 25° C., which amounts to about 3 litres per cubic metre—making the total water required up to 15 litres of water per cubic metre of gas (equal to 100 gallons per 1000 cubic feet).

There is another important fact to be considered. The back-pressure

of the Feld apparatus is very low. From 5 to 10 mm. per washer are the average figures obtained at the Königsberg plant. As two Feld washers will extract the total ammonia present in the gas, together with about 60 per cent. of the total sulphuretted hydrogen, the back-pressure for the ammonia extraction is about 20 mm.

The extraction of the ammonia, however, by the direct sulphatation process in the acid bath gives a back-pressure of 500 to 600 mm. This is very important for the power consumption of the exhauster. For 120,000 cubic metres (4,250,000 cubic feet) of gas, for instance, the power required by the exhauster is, with 20 mm. back-pressure, about 4 H.P., with 550 mm. back-pressure about 25 H.P.

In applying the direct sulphatation process, gas-works want a purification plant of normal size. The cost for purification in Germany (including interest and depreciation of plant) is about 1d. per 100 cubic metres of gas—3d. per 10,000 cubic feet. Though we know that with the Feld thionate process we can at least extract about 80 per cent. of the total sulphuretted hydrogen, we only guarantee 60 per cent. By this preliminary extraction of 60 per cent. of the sulphuretted hydrogen, simultaneous with that of ammonia, the purification is considerably relieved; so that the cost of purification is reduced to ½d. per 100 cubic metres of gas—1½d. per 10,000 cubic feet. Besides this, all the sulphur extracted from the gas will be sold; spent oxide being used for the production of the sulphur dioxide required for the regeneration of the polythionate liquor. Thus on each unit by weight of ammonia extracted from the gas, at least eight-tenths of a unit of sulphur is recovered in soluble form.

Furthermore, as with the Feld thionate process no ammonia water is obtained, steam and lime, and wages for the ammonia distilling plant are saved.

Taking all this into consideration, we get the following comparison of cost for both :—

(A) The direct sulphatation plant.
(B) The Feld thionate plant.

As a basis of the estimate, we take the following plant: Coal distilled per day, 400 tons, with a daily production of 120,000 cubic metres, or about 4¼ million cubic feet, of gas, equal to about 5 tons of sulphate per day.

### A.—Cost of Operating the Direct Sulphatation Plant.

(1) *Estimate per Day of Maximum Capacity.*

| | | s. | d. |
|---|---|---|---|
| (*a*) Wages— | | | |
| 1 engineer and 1 assistant for gas plant per shift, 2 workmen for ammonia plant per shift = | | | |
| 2 engineers, at 6s. per day | 12s. | | |
| 6 men at 5s. per day | 30 | | |
| | | 42 | 0 |
| (*b*) Power and steam— | | | |
| Pumps | 15 H.P. | | |
| One centrifugal | 5 ,, | | |
| Exhauster* | 25 ,, | | |
| Shafting, &c. | 15 ,, | | |
| Total | 60 H.P. = | | |
| 1440 H.P.-hours, at 33⅓ lbs. of steam = 21 tons of steam at 3s. per ton | | 63 | 0 |
| [*Note.*—The waste steam of the steam-engines is used for the distilling apparatus.] | | | |
| (*c*) Water— | | | |
| 120,000 cubic metres of gas, at 15 litres of water, at ¼d. per ton | | 75 | 0 |
| (*d*) Lime for distillation of ammonia water— | | | |
| 20 lbs. per ton of ammonia water, 3 tons of liquor = 60 lbs., at 12s. 6d. per ton | | 0 | 3 |
| (*e*) Repairs | | 8 | 9 |
| (*f*) 5 tons of sulphuric acid, at 35s. | | 175 | 0 |
| (*g*) Purification, 3d. per 10,000 cubic feet of gas, for 4¼ million cubic feet | | 106 | 0 |
| Total cost per day | | £23 | 10 | 0 |

(2) *Estimate per Year with Average Capacity.*

As the production of gas is higher in winter than in summer, we estimate the maximum output of sulphate and the cost of water, lime, sulphuric acid, and for purification for 250 days only, whereas for the other cost we estimate 360 days.

| | | | | |
|---|---|---|---|---|
| Total production of sulphate of ammonia per year— | | | | |
| 1250 tons (250 × 5), at £12 per ton | | | £15,000 | 0 0 |
| Total cost per year— | | | | |
| (*a*) Wages (360 × 42s.) | £756 | 0 0 | | |
| (*b*) Power and steam (360 × 63s.) | 1134 | 0 0 | | |
| (*c*) Water (250 × 75s.) | 937 | 10 0 | | |
| (*d*) Lime (250 × 3d.) | 3 | 2 6 | | |
| (*e*) Repairs (360 × 8s. 9d.) | 157 | 10 0 | | |
| (*f*) Sulphuric acid (250 × 175s.) | 2187 | 10 0 | | |
| (*g*) Purification (250 × 106s.) | 1325 | 0 0 | | |
| | | | 6,500 | 12 6 |
| Net profit on ammonia | | | £8,499 | 7 6 |

Equal, per year and 100,000 tons of coal, 1s. 8d. per ton of coal.

### B.—Cost of Operating Feld's Thionate Plant.

(1) *Estimate per Day of Maximum Capacity.*

| | | s. | d. |
|---|---|---|---|
| (*a*) Wages—Same as A | | 42 | 0 |
| (*b*) Power and steam— | | | |
| Two washers | 24 H.P. | | |
| Pumps | 12 ,, | | |
| Centrifugal | 5 ,, | | |
| Exhauster | 4 ,, | | |
| Shafting, &c. | 15 ,, | | |
| | 60 H.P. = A | 63 | 0 |
| [*Note.*—The waste steam of the steam-engines is used for the vacuum apparatus.] | | | |
| (*c*) Water— | | | |
| 120,000 cubic metres of gas, at 5 litres per cubic metre = 600 tons, at ½d. per ton | | 25 | 0 |
| (*d*) Lime—None | | .. | |
| (*e*) Repairs—Same as A. | | 8 | 9 |
| (*f*) Sulphuric acid—None | | .. | |
| (*g*) Purification— | | | |
| 1½d. per 10,000 cubic feet of gas for 4¼ million cubic feet | | 53 | 0 |
| Total cost per day | | £9 | 11 | 9 |

(2) *Estimate per Year with Average Capacity.*

| | | | | |
|---|---|---|---|---|
| Total production per year— | | | | |
| *(*a*) 1250 tons of sulphate of ammonia (250 × 5) at £12 | | | £15,000 | 0 0 |
| (*b*) 250 tons of sulphur, at £2 10s.† | | | 620 | 10 0 |
| Total income per year | | | £15,620 | 10 0 |
| Total cost per year— | | | | |
| (*a*) Wages | £756 | 0 0 | | |
| (*b*) Power and steam | 1134 | 0 0 | | |
| (*c*) Water (250 × 25s.) | 312 | 10 0 | | |
| (*d*) Lime | .. | | | |
| (*e*) Repairs | 153 | 10 0 | | |
| (*f*) Sulphuric acid | .. | | | |
| (*g*) Purification (250 × 53s.) | 667 | 10 0 | | |
| | | | 3,023 | 10 0 |
| Net profit on ammonia and sulphur | | | £12,597 | 0 0 |

Equal, per year and 100,000 tons of coal, 2s. 6d. per ton of coal.

| | | | |
|---|---|---|---|
| Net profit per year— | | | |
| Feld's thionate process | £12,597 | 0 | 0 |
| Direct sulphatation process | 8,503 | 7 | 6 |
| Excess in favour of the thionate process over the direct sulphatation process for 100,000 tons of coal distilled per year | £4,093 | 12 | 6 |

Or 9½d. per ton of coal.

If we take into consideration that the thionate process will in all probability solve the problem of the nearly complete wet extraction of sulphuretted hydrogen, and thus do away with about nine-tenths of the cumbrous and troublesome dry purification, we shall see what a great future lies before it.

I feel sure that the next plant will prove this fact, which, from extensive experiments on the large scale, I already regard as beyond all doubts, whether from the theoretical or from the practical point of view. It is, in fact, rather remarkable that, at every stage in the development of this process, once the proper adjustments have been made to large-scale working, practical plants have given better results than those obtained with laboratory experiments.

*Linz-on-Rhine, July* 8, 1913. Walther Feld.

* For the exhauster only so much power is calculated as corresponds with the back-pressure of the ammonia extraction.

* The yield of ammonium sulphate with the direct sulphatation process is not complete, and therefore the yield with the thionate process is in fact higher.
† The price of sulphur is, in fact, higher than is estimated.

## The Woodall-Duckham Retorts at Toulouse.

Sir,—In the report of the proceedings at the recent congress of the Société Technique du Gaz en France at Toulouse which appeared in the "Journal" on the 24th of June and the 8th inst., there is an error which we shall be pleased if you will correct. The installation of vertical retorts on the Woodall-Duckham continuous system which was shown to the congressists at the Toulouse Gas-Works was carried out by the Compagnie Générale de Construction de Fours, who are the owners of the patents for France protecting the process, and not by our own Company. It was in his capacity of Managing-Director of the Compagnie Générale de Construction de Fours that M. Heeley described the installation at the meeting.

La Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz,
per G. Heeley, a Managing-Director.

*Paris, July* 10, 1913.

## The Dessau Verticals at East Hull.

Sir,—Will you allow us to say that, by a clerical error in the particulars sent you [on which the paragraph appearing on p. 96 was founded], the number of candles per ton in the recent carbonizing results at East Hull was stated as 44,286, instead of 44,826. The candle power works out at 14·8; and the B.Th.U. are gross.

C. Holmes Hunt,
Secretary, Vertical Gas-Retort Syndicate, Limited.

17, *Victoria Street, S.W., July* 10, 1913.

**Gas-Cookers at Brighton (Victoria).**—The Brighton (Victoria) Gas Company, Limited, have 2582 gas consumers, and 1742 of them use gas-cookers. These figures are incidentally mentioned in a letter received from Mr. H. V. Mitchell, the Engineer and Manager of the Company; and we congratulate both him and his Company. In the district there are two electric-cookers; and he believes they are "both on the shelf."

**Tipton Gas Undertaking.**—In the "Journal" a fortnight ago, we noticed the annual report of the Gas Engineer and Manager of the Tipton Urban District Council (Mr. Sidney O. Stephenson); and it was mentioned that the past financial year had been a very good one. This is borne out by the statement of accounts, a copy of which has just reached us. The profit on the revenue account was £7853, compared with £6182 for the year 1911-12. After paying interest and the instalment of the sinking fund, there was a balance of £3280 at the close of the year. This is a record figure, and it brings up the accumulated profits to £11,045. Of this sum, £600 has been appropriated in relief of the rates; leaving £10,445 to be carried forward.

# REGISTER OF PATENTS.

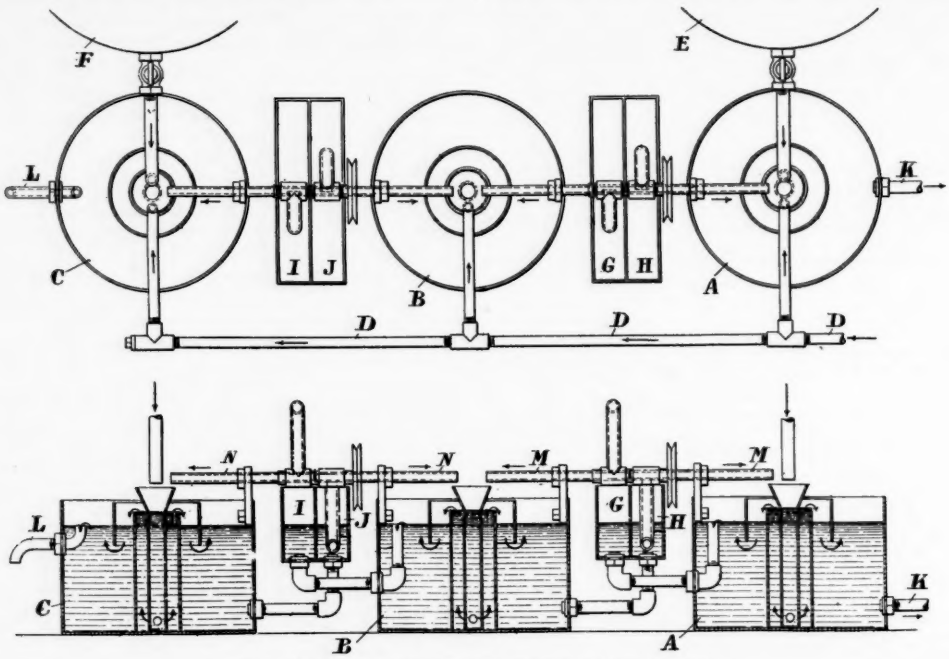
## Washing Coal-Tar Oils.

HIRD, H. P., of Norwood Green, near Halifax, CHAMBERS, E. V., and HAMMOND, T. C., of Huddersfield.

No. 16,385; July 13, 1912.

This invention relates to the separation from coal tar oils of the phenols or the pyridine bases or extractible matters contained in such oils, and subsequently treating or washing the oils.

A plan view and sectional elevation are shown of one form of the apparatus by means of which the invention may be put into practice.




**Hird, Chambers, and Hammond's Washer for Coal-Tar Oils.**

Three vessels A B C are employed, set at suitable distances apart. Each vessel has centrally thereof a chamber of slightly less depth than the vessel itself. Extending to the lower end of each chamber is a pipe having openings near the lower end of it, and having a funnel-shaped mouthpiece near its upper end. Steam or air, or a mixture of steam and air, from a suitable source of supply is conducted from a service-pipe D (through branches) to the lower part of each chamber, so as to create agitation and intimate admixture of the liquids admitted. At one end of the apparatus is a vessel E containing the unwashed oil which flows from it, past a regulating cock and pipe, into the funnel-topped pipe in the chamber of the vessel A, from which pipe it passes through the openings into the surrounding chamber, over the top of which it overflows into the outer vessel A. At the opposite end of the apparatus is a vessel F containing caustic soda in liquid form, which is permitted to flow past a regulating cock into the funnel-topped pipe in the vessel C—that is to say, the vessel furthest removed from that into which the oil first flows.

Between the vessels A B are located a pair of troughs or channels G H, and between the vessels B C are a similar pair of troughs or channels I J. From a given level in the vessel A a pipe communicates with the trough G, and a similar pipe leads from the same level in the vessel B to the trough I. A discharge pipe K is provided in the lower part of the vessel A, and a similar pipe L, having an elbow extending up to the same level as the other pipes, is provided in the vessel C.

The oil, which is the lighter body, is skimmed off the top of the liquid in each vessel and passes in one direction to the respective trough or channel; while the caustic soda and dissolved phenols or other extractible matters which comprise the heavier bodies flow from the bottom of the vessels in a contrary direction to that of the oil. The oil fed to the apparatus emerges at the discharge pipe L, while the caustic soda emerges along with the phenols in solution at the discharge pipe K.

Supported between and above the vessels A and B is a hollow shaft M, and between and above the vessels B and C is a similar hollow shaft N. Both are driven at a suitable speed from any convenient source of motion. Mounted on the shafts are a series of curved or semi-circular hollow arms communicating internally with the bores of the respective portions of the shafts, which are made-up between the respective pairs of hollow arms. The hollow arms revolve in the troughs or channels, and at each revolution pick up a quantity of the liquid contained in the respective troughs—such liquid flowing forward through the respective portions of the hollow shaft and being delivered to the funnel-topped pipe of the next succeeding vessel of the apparatus.

The mixture of oil and caustic soda fed into each pipe is agitated and intimately mixed in the respective chambers by the steam or air, or mixture of steam and air, supplied, and passes over the tops of the chambers into the surrounding outer vessels—shields or guards surrounding the chambers being provided to prevent any agitation of the surface of the liquid in the vessels as liquid passes into it. The caustic soda and the phenols extracted by the action of the soda on the oil fall to the bottom of each vessel while the oil rises to the top; the oil becoming gradually freed from phenols as it passes from the vessel A to the discharge pipe in the vessel C. The process is continuous so long as oil and caustic soda are supplied to the feed vessels and the hollow arms are kept revolving through the troughs or channels.

For extracting the pyridine bases or other extractible matter from oils, a suitable acid or other re-agent is employed in lieu of the caustic soda—the operation being as previously described.

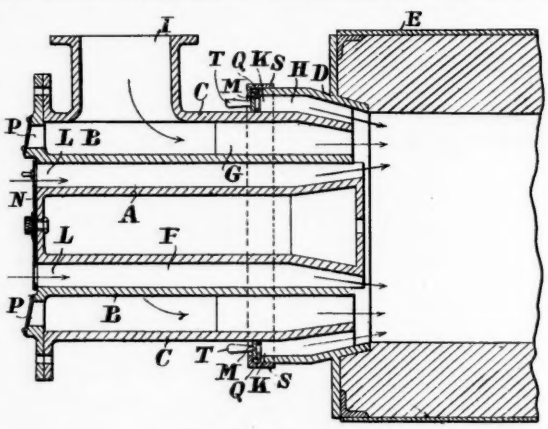
## Gas-Burners.

FISCHER, J., of Rodange, Grand Duchy of Luxemburg.

No. 18,359; Aug. 9, 1912.

This invention has for its object to provide a gas-burner (especially for metallurgical apparatus and more particularly for steam-boilers) constructed in such a manner as to produce "a rapid and complete combustion of the gas." The arrangement of the burner is said to be such that the flame produced is not a blow-pipe flame, but (on the contrary) a flame having no other direction than that given it by the draught, as in the case of a steam-boiler. Thus the parts exposed to the flame "become no more deteriorated than is the case of a chamber of preliminary combustion."

A longitudinal section is given showing the burner applied to a metal tube lined with refractory material and connected to the apparatus to be heated. The burner consists essentially of four cast-iron parts A B C D nested in one another. The external part D is fixed to the tube E connected to the heating apparatus. The internal parts A B C carry helicoidal vanes F G H (alternately right-handed and left-handed), which direct the gas and air and also maintain the concentricity of the parts within one another. The gas is admitted through the connection I into the annular space between the parts B and C and between the side surfaces of the helices G carried by the part B. Air is admitted concentrically with the gas through the orifices K and L in such manner that the air is guided by the helices F and H in the opposite direction to the direction of the gas. The regulation of the quantity of gas is obtained by throttling the inlet I. The regulation of the comburent is performed in the usual way by superposed discs M and N, which, by their rotation, permit of closing (more or less completely and independently of one another) the entrances to the spaces between the two groups of vanes which direct the comburent. The




**Fischer's Gas-Burner.**

openings P formed in the end flange of the part B and normally closed permit of cleaning this part of the burner or the path of the gas during the operation of the burner.

The extremities of the parts A and D at the end where the gas issues from the burner "advantageously have a conical formation, so that the two jets of air will be directed towards the gaseous jet, and therefore also a more intimate mixture of the fluids will be produced."

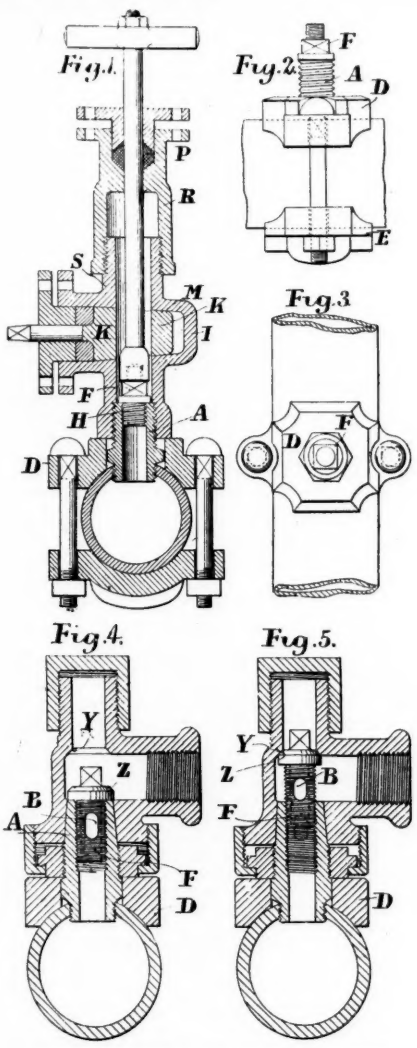
This construction of burner is said to possess the following advantages: (1) Complete combustion of the combustible without excess of carburent. (2) Complete utilization of the calorific value or capacity of the combustible along the whole effective path of the flame, since the combustion is complete from the point of entry of the flame into the circuit or apparatus in which the heat is to be utilized. (3) Reduction to a minimum of losses by radiation; the complete combustion being attained instantaneously. (4) Good preservation of furnace-tubes, which are not submitted to a blow-flame effect as in other burners.

## Connecting Branch and Main Pipes.

MITCHELL, E. A., of Broad Street Avenue, E.C.

No. 19,440; Aug. 24, 1912.

The mode of connection, according to this invention, consists, after locking the nipple against rotation, in attaching a stop-cock, valve-casing, or equivalent, on to the nipple; then attaching the sealing device to the outlet of the stop-cock or an equivalent aperture; and manipulating the tool from outside the device so that it can be used to operate the plug, which may either be removed through the closing member of the stop-cock, and the stop-cock then closed, or else moved to a position where it coacts with the valve-casing to isolate the sealing device, which is ultimately removed.




**Mitchell's Branch and Main Pipe Connector.**

Fig. 1 is a transverse section of part of a main with one arrangement of the invention applied thereto; fig. 2, a side elevation of a portion thereof; and fig. 3, a corresponding plan.

The nipple A is formed intermediate of its length with a polygonal collar, so that after being fitted to the main pipe it can be prevented from rotating by means of a saddle D, bolted to a companion saddle E. The plug F for closing the nipple may be formed with a projecting end having an external screw thread of opposite hand to that of the portion H co-operating with the nipple. When, after the plugged nipple has been fitted to the main, it is desired to connect a branch, a stop-cock I (having a branch screw threaded to correspond to the nipple) is secured in place—having a plug K with a port M, which will permit the passage through it of the tool for removing the nipple-plug. This tool may be in the form of a rod having a socketed head screw threaded internally to engage the screw thread on the projecting end of the plug F, and adapted to move longitudinally, as well as to be rotated, through a stuffing-box in a cap screwed on to the branch S of the stop-cock which is to receive the branch pipe. After the removal of the plug F from the nipple and its withdrawal through the port of the plug K, the stop-cock is closed; the branch pipe connected (after removing the sealing device R P), and the cock re-opened.

In figs. 4 and 5, in lieu of a stop-cock, the connection of the branch with the main pipe may be effected through a T-piece having one of its aligned limbs adapted to fit over the nipple A—the co-acting surfaces being, for this purpose, tapered. At the junction of the lateral limb with the limb of the aligned limbs, a valve-seating Y is formed; the plug F being correspondingly provided with a valve Z and made with a longitudinal passage and lateral port in such wise that when the plug F, which normally seals the nipple, is sufficiently retracted to cause the valve Z to engage the seat Y, the lateral branch of the T-piece is placed in communication with the main pipe through the lateral port B and its longitudinal passage—it being understood that the branch pipe is connected up before the plug F is retracted. The plug can be manipulated by a key, in a similar way to that just described; the limb of the T-piece that receives the sealing device R P (fig. 1) being normally closed by a cap.

## Automatically Lighting and Extinguishing Gas-Burners.

ANDERSON, H., of Manchester.

No. 12,732; May 30, 1912.

This apparatus is operated by time mechanism for both automatically lighting and extinguishing gas-lamps at predetermined times—the spring-driven timing mechanism turning on and off the gas supply to the burner and pilot lights and also operating the sparking mechanism for igniting the gas. The invention (which is on similar lines to that dealt with in patent No. 5062 of 1912) is not further described apart from two sheets of detail drawings—16 figures in all—accompanying the specification.

## Gas Cooking Stoves.

LAWTON, W. A., of Upper Montague Street, Russell Square, W.C.

No. 20,322; Sept. 6, 1912. No. 20,990; Sept. 14, 1912.

This combined invention relates particularly to open gas-stoves of the kind comprising one or more horizontal burners, and means for supporting food opposite thereto, so that it can be cooked by the heat radiated from the burner flames and from an asbestos radiator arranged above the burner. The stove is intended to be rigid when in use, but capable of being readily dismantled for cleaning purposes, and to facilitate transportation.

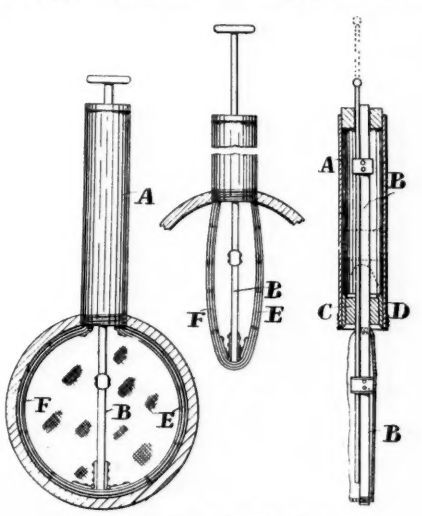
The stove comprises a burner or burners adapted to produce vertical heating flames, or substantially a wall of flame, and horizontal grids arranged at or near the top and bottom of the flame, for supporting food adjacent to the sides, "so that the food is cooked by the heat radiating therefrom." It is not further described apart from a series of six sheets of drawings.

## Temporarily Closing Gas-Mains.

TOON, C., of Christchurch, New Zealand.

No. 21,174; Sept. 17, 1912. Convention date April 1, 1912.

This temporary main pipe stopper is of the type in which a collapsible spring frame fitted with a flexible diaphragm has its opposite sides attached to two sliding rods—the diaphragm being adapted to be expanded. Only a comparatively small tapped hole is required in the main to take a capped tube within which the parts are contained.




**Toon's Temporary Main-Pipe Stopper.**

The tube A has within it a standard B slidable through a cap fixed in the top. A plunger C, slidable within the tube and on the standard B, is attached to an operating rod having a handle at the top. A cup leather D, secured to the plunger, makes an air-tight joint between the plunger and the tube A. Springs E F are connected to the bottom of

the standard by hinges, the other ends of the springs being attached by hinges to the plunger.

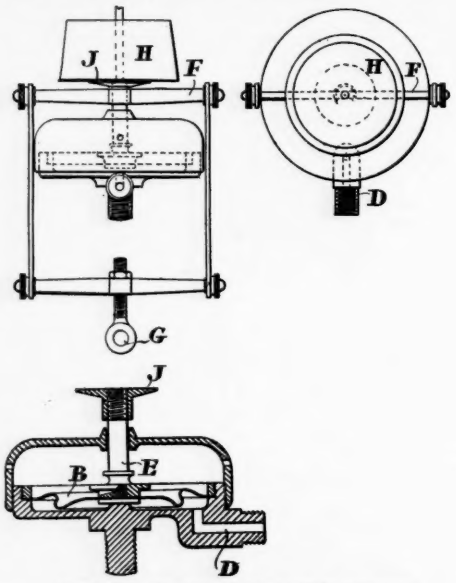
In operation, the tube A, being screwed into the main, the plunger abuts against the underside of the cap, and the diaphragm is nearly within the tube. The handle is set at right angles to the line of main pipe and then depressed. The central rod in its downward movement carries forward the plunger C and with it the standard B, until the lower end of the latter rests upon the bottom of the main, when the further descent of the plunger forces out the springs E F, which then fully open and automatically lock the apparatus, until, by pulling upon the handle, the diaphragm is withdrawn from the main into the tube A. The withdrawal of the diaphragm is effected by raising the handle, thus lifting the plunger until it reaches the position G, and on further withdrawal the central rod, together with the standard and diaphragm, is raised bodily.

## Governing Engines Employed for Forcing Gas and Air through Mains.

M'KINLAY, R., of Vauxhall, S.E.

No. 22,136; Sept. 28, 1912.

This invention relates to the governing of engines employed for forcing gas and air through mains at various pressures—particularly where the pressure has to be changed at different times of the day. The apparatus comprises a weighted diaphragm subjected on one side to the pressure of the gas in the mains, while the other side has a frame supported or suspended thereon by means of a rod or other connection in such a manner as to be substantially free from all frictional contact—the frame being subject to the movement of the diaphragm and being connected to the engine controlling mechanism whereby the device will operate to reduce or cut off the supply of steam, fuel, electricity, or other motive power to the engine.




**M'Kinlay's Governor for Gas Main Pressure.**

The governor is shown in elevation and plan; and there is a sectional view of it.

The governor consists of a casing the bottom half of which forms a chamber covered by a diaphragm B. The chamber is connected to the gas or air main by a passage D and suitable connections, so that the diaphragm is acted upon by, and is rendered susceptible to, variations in the gas pressure in the main. To the diaphragm is attached a rod E, upon which a frame F is hung by means of an upper cross-bar. The lower cross-bar is provided with an eye G for connecting it to the controlling mechanism on the engine. The upper part of the rod E, or the cross-bar, is provided with a tray J adapted to receive weights H, which can be changed as required.

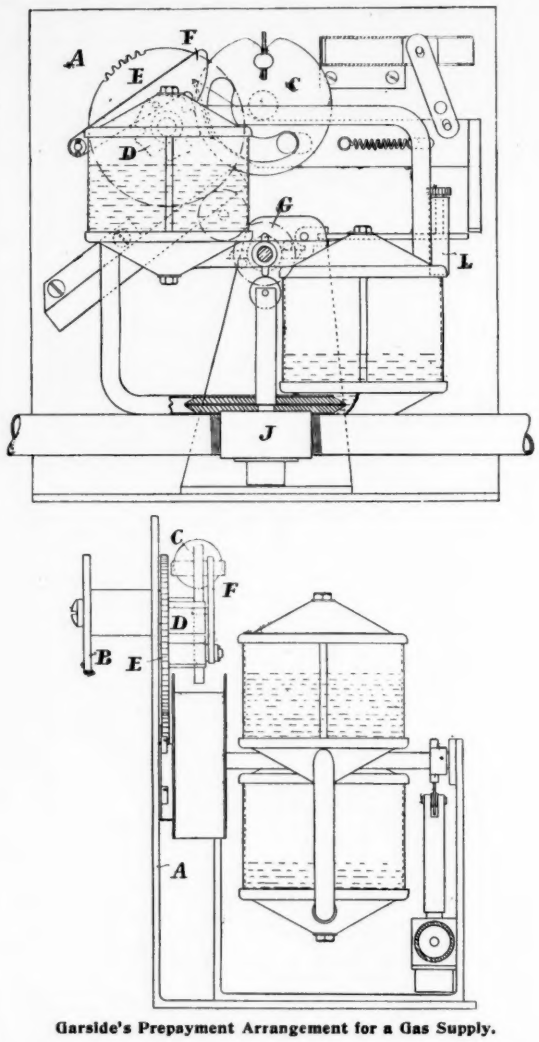
Assuming that the governor is attached to a gas-engine, the eye G is coupled to the hit-or-miss gear, and the operation is as follows: The governor is loaded to the predetermined pressure by placing weights upon the tray attached to the piston-rod E. The engine is allowed to run up to such speed that the required gas or air pressure is reached, when the pressure, acting under the diaphragm D, overcomes the resistance offered by the weights and raises the piston-rod E, which, in turn, lifts the bar frame F and connection G, causing a "miss" at the inlet valve of the engine. The engine continues to "miss" until the pressure drops almost immediately below the required point, when the weights overcome the pressure under the diaphragm and force down the piston-rod E, reversing the above motion and permitting the gas-inlet valve to again operate until the required pressure is reached again, when the above operations are repeated.

## Prepayment Apparatus for Gas Supply.

GARSIDE, E., of Darlington.

No. 22,325; Oct. 1, 1912.

This controller for the delivery of a predetermined amount of gas consists of two chambers mounted on a pivoted support and utilized to control the supply by the passing of liquid from the higher to the lower chamber by gravity. It is particularly applicable for the delivery of gas at constant pressure for a predetermined length of time—such as in hotels and other places, so that by the insertion of a coin of a given denomination the apparatus can be set in such a way as to turn on the gas and maintain it turned on for a given period, whereby the use of a gas-stove (say) is permitted for a predetermined time.




**Garside's Prepayment Arrangement for a Gas Supply.**

A front and end elevation of one form of the apparatus is shown—partly in section and with the front bearing removed for the sake of clearness.

Upon the external part of the frame A of the machine is rotatably mounted a handle B, which carries on the inside end a coin-carrier C having a slot for holding the coin. In the path of the coin is mounted a star-wheel D, to which a cog-wheel E is rigidly attached. Upon the frame is pivoted a detent F, carrying a pin adapted to engage in one of the recesses of the star-wheel. The free end of the detent (of curved shape) engages with the coin so that the latter lifts it during the movement of the coin-carrier to release a pin from the particular recess with which it is engaged, so that the coin can engage with another recess and turn the star-wheel and the wheel E with which it is associated. The periphery of the coin-carrier has a recess where the coin is carried; and this circular portion co-acts with a concave part of the star-wheel, so as to lock it from movement except when the coin is engaged with it. The movement of the coin-carrier is limited by a slot co-acting with a stop-pin mounted in the frame; and after the coin has completed its co-action with the star-wheel, it falls out of the slot into a delivery shoot.

The wheel E gears, by means of an intermediate wheel, with a spur-wheel G carrying two pins projecting from it and adapted to co-act with wings mounted rigidly on the shaft. Upon the centre of the shaft is a boss H, to which are attached the covers or ends of the liquid chambers shown; and at the end of the shaft is rigidly attached a boss having wings adapted to co-act with a wheel of the gas-control valve J.

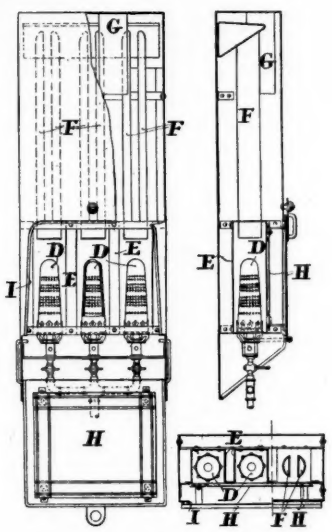
The operation of the device is as follows: A coin inserted into the machine becomes the connecting agent between the external handle B and the star-wheel D of the operating gear of the liquid chamber support. When the handle is moved, the chamber having the most liquid in it is raised in clockwise direction to a level above the chamber containing the less amount of liquid, and is retained there by the detent F. At the same time this setting movement is utilized to open the valve J controlling the fluid to be controlled. The liquid now gradually flows from the upper to the lower chamber until the time has elapsed when the lower chamber has such a preponderance of weight as to overcome the resistance of the weight against the bevelled projection of the wing carried by the shaft L, when the liquid chambers and their support suddenly move round in the same direction as they were moved in the setting operation. This final movement is utilized to trip the retaining device or wing holding the control valve J open against the elastic closing pressure of the spring, and the supply of gas is suddenly cut off.

## Gas-Stoves.

FISCHER, P., of Stuttgart, Germany.

No. 23,866; Oct. 18, 1912. Convention date, Oct. 18, 1911.

This stove is adapted for combined radiation and convectional heating, or alternatively for convectional heating alone. The "novel feature consists in the use of a plurality of incandescence bodies, each heated by a separate bunsen burner and each enclosed at the back and sides by walls of thin sheet-metal which serve as reflectors, and also as the walls of air-passages through which air, for convectional heating, circulates through the stove."




**Fischer's Gas-Stove.**

In the form of stove shown, a number of bunsen burners have disposed above them incandescence bodies D, perforated and conical in shape, so that the hottest part of the flame impinges on them. Around each body is a reflector E, of polished metal, which forms a chamber to enclose the incandescence body on three sides. The several reflectors are joined together in front, but have channels between them for the free circulation of air entering the stove at the bottom. The reflector E causes the greater part of the heat radiated by the bodies D to be concentrated towards the front; and the air which ascends through the channels escapes from the stove at G. The products of combustion ascend through flues F, the walls of which also serve to heat the air within the casing of the stove. These pipes are joined at the top to a kind of exhaust-box having a discharge opening.

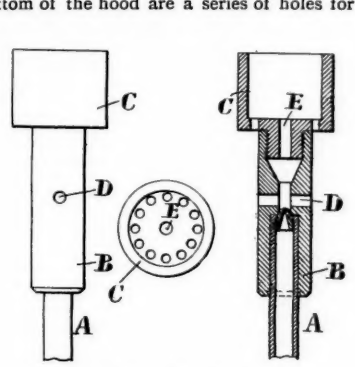
The stove acts as a combined heat radiating and convectional heating stove; and in order to enable it to be used solely as a convectional heating stove there is provided a double-walled flap H, which is moved for the purpose, so that it closes the opening I in front of the incandescence bodies. In this case, the radiation is entirely cut off from the room; but the air entering the stove casing from below is heated while ascending through the channels and the space around the pipes or flues—the heated air passing out of the stove at G, and "a very efficient circulation of air taking place."

## Bye-Pass Burners.

GUNNING, J., of Bournemouth.

No. 10,294; May 1, 1913.

This double bunsen burner comprises a tube A for attachment to the gas supply pipe, a sleeve B bored to fit the top of the tube, and a hood-piece C (preferably of steatite) provided with a depending, reduced tubular part screwed for connection to the top of the sleeve. The sleeve is provided with a transverse duct for a primary air supply to the burner, and in the bottom of the hood are a series of holes for a secondary supply of air.




**Gunning's Bye-Pass Gas-Burner.**

For checking the pressure and consumption of gas, the upper end of tube A may be filled with steatite, through which is a very restricted duct for the passage of the gas.

In order that the end of the tube may assume a correct position when inserted into the sleeve B, the bore of the sleeve is made smaller between the air inlet D and the hood C, so as to form a shoulder for the tube to fit against.

Gas passing up the tube A mixes within the upper portion of the sleeve with air flowing from the duct D. The mixture issuing at E "combines with the secondary air, and when ignited burns within the hood, which effectually protects the flame from being blown out."

# PARLIAMENTARY INTELLIGENCE.

## HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bill brought from the Commons, read the first time, and referred to the Examiners: Barry Urban District Council Bill.

Bills read a second time: Blyth and Cowpen Gas Bill, Heathfield and District Water Bill, Local Government Provisional Order (Gas) Bill.

Bills reported: Aberystwyth Corporation Bill, Bournemouth Gas and Water Bill, Morley Corporation Bill, Titchfield District Gas Bill.

Bills read the third time and passed: Gas and Water Provisional Orders Bill (No. 2), Leicester Corporation Bill, Metropolitan Water Board Bill, Tottenham and Edmonton Gas Bill, Westgate and Birchington Gas and Electricity Bill.

### Borrowing Powers of Local Authorities.

On the motion of Lord Dunmore, a return was ordered last Wednesday showing (*a*) the limitations placed by various Acts of Parliament upon the borrowing powers of each class of local authority in the United Kingdom, specifying each authority separately; (*b*) the cases in which, by subsequent Public Acts of Parliament, provision has been made whereby money for various purposes is to be excluded from being reckoned as part of the debt of a local authority for the purposes of the limitation on borrowing previously imposed by Parliament; and (*c*) the cases in which, by private legislation, the borrowing powers of any local authority have been extended beyond those allowed under the general law.

## HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Lords Bills read the first time and referred to the Examiners: Leicester Corporation Bill, Metropolitan Water Board Bill.

Lords Bill read a second time and committed: Worthing Gas Bill.

Lords Bills reported: Broadstairs and St. Peter's Urban District Council Bill, Grays and Tilbury Gas Bill, Tynemouth Gas Bill, West Hampshire Water Bill.

Lords Bill read the third time and passed: United District Gas Bill.

The Carlow Rural District Council and the Carlow Board of Guardians have petitioned against the Gas and Water Orders Confirmation (No. 1) Bill [Lords], in respect of the Bagnalstown Gas Order.

## HOUSE OF COMMONS UNOPPOSED BILLS COMMITTEE.

### Thursday, July 10.

(*Before Mr.* WHITLEY, *Chairman, Mr.* E. MOON, K.C., *Speaker's Counsel, Mr.* M'LEAN, *Mr.* STAVELEY HILL, *and Mr.* R. ROBERTS.)

### Tynemouth Gas Bill.

The following Bill, which has already been passed by the House of Lords, came before the Unopposed Bills Committee of the House of Commons last Thursday.

Mr. COOPER (Messrs. R. W. Cooper and Sons) explained that the Bill was promoted by the Tynemouth Gas Company, and the main object of it was to authorize an extension of the limits of supply at the request of the local authorities concerned. Clause 30 enabled the Company to subscribe to the funds of the local hospital. The Company had done this in the past without parliamentary powers; but they thought that, as they were coming to Parliament with a Bill this year in any event, the best thing to do was to include a clause giving them power, in order to clear up any doubt there might be. It was a maximum price company; and it had been considered doubtful whether such a company, paying the maximum dividend, had the right to contribute to objects of this character money which it might be thought really belonged to consumers, assuming that the maximum price was being paid. The clause was objected to in the first instance by the Tynemouth Corporation; but on the facts being explained, the Corporation withdrew their opposition. He mentioned this merely to show that the point had been raised with those concerned. Of course, any contributions made could only be given within the area of supply. The Company's workpeople would use the hospital; and this was the main reason for the application.

The CHAIRMAN asked whether the Company proposed to subscribe in proportion to the use which their workpeople made of the hospital.

Mr. COOPER said not strictly in proportion; but on the whole that might be said to be the case.

The Committee allowed the clause.

With regard to clause 31, which enables the Company to supply consumers on varying terms according to the purposes for which they use gas, the Local Government Board had presented a report, and

objected on the ground that section 13 of the Gas-Works Clauses Act of 1847 practically gave the same power.

Mr. COOPER said the Company had been advised that this section did not give the power asked for in clause 31 of the Bill. As a matter of fact, this opinion had also been held at one time by the Lord Chairman's Counsel in the other House. The Company were faced with very strong competition from the electric lighting undertaking in their district, who had a similar power to that being sought in the present Bill; and other gas companies in the neighbourhood also had a special provision which enabled them to achieve the same object. The legal point had arisen as to whether the Company had a right to charge a different price according to the different purposes for which the gas was consumed; and in consequence of the Lord Chairman's Counsel's objection, the advice of Sir Robert Finlay had been sought. He had expressed the opinion that the Company did not have the power to charge in the way now desired, and that it was advisable to get it. The clause in the Bill was practically in the terms advised by Sir Robert Finlay. As things stood at present, the Company were bound to charge a consumer of gas for power purposes the same rate as was charged for lighting.

Mr. MOON remarked that the power under the Gas-Works Clauses Act enabled the Company to charge different prices according to the quantity taken, but not to vary the price according to the purpose for which the gas was used.

The CHAIRMAN, speaking with regard to the proviso that similar terms must be given to other people in similar circumstances, asked how other consumers would know the prices being charged to people using gas in the same way as they might desire to.

Mr. COOPER said it would be the consumers' business to find out; but, at the same time, there would be no object on the part of the Company in treating differently consumers using similar quantities for similar purposes.

The clause was passed by the Committee.

### Grays and Tilbury Gas.

Mr. H. R. CRIPPS (Messrs. Dyson and Co.) explained that the proposal of the Bill was to amalgamate a number of gas-works in districts adjoining the Company's existing area, and to raise £120,000 new capital for the purpose. The benefit to the outside districts was a reduction in the price of gas, which at present varied from 4s. to 5s. per 1000 cubic feet, to a uniform price of 4s. 2d. When the Bill was before the House of Lords, it was opposed by the Essex County Council and several district councils; but clauses had been put in which satisfied them. Since then certain objections had been raised by some of the parish councils; the principal one being that the Company were being granted a monopoly for all time. They had, however, satisfied these districts—or, rather, the Member of Parliament who was concerning himself in the matter—that the objections were rather over-stated, because it was specifically provided in the Bill that if the Company did not supply gas the existence of the powers under the Bill would not interfere with anyone else doing so.

The CHAIRMAN, speaking on the question of price, said that 3s. 8d. in the inside area of the Company seemed high for gas supplied from a works situated on the Thames.

Mr. BARTLETT (the Chairman of the Company) said the question of price was one of population.

Mr. MOON remarked that in Wandsworth the price was 1s. 9d.

The CHAIRMAN said assuming 2s. 6d. as an average price for a densely-populated area, how did the Company justify 4s. 2d. for their outside area?

Mr. BARTLETT replied that the Company had miles of mains with very few consumers on. The present output of the Company was 83 million cubic feet, and the population only 25,000, which, it would be seen, must be very scattered, having regard to the size of the area. It was estimated that to lay mains properly in the whole district now being taken in would cost £50,000; meters, stoves, &c., £12,000 to £15,000; while the agreements to purchase the existing gas-works amounted to about £36,000. On the old area there were unexpended capital powers of £50,000; but the demand was growing so rapidly that it was anticipated the whole of this would be required in the next few years. Originally the Company had asked for £150,000 new capital powers. But they had been cut down as far as possible; and though the amount now asked for was £120,000, he anticipated having to come to Parliament in about seven years for more capital.

The CHAIRMAN, remarking that he did not see any better proposition likely for the district, announced that the preamble of the Bill was proved.

## PROGRESS OF SUNDRY PRIVATE BILLS.

The following Bills were before the Unopposed Bills Committees of the House of Lords and the House of Commons last week, and were sent forward for third reading.

*Gas and Water Provisional Orders (No. 2) Bill.*—Included in this Bill were the following Orders: (1) Faversham Gas Order, in which limits of supply of the Faversham Gas Company are extended, and the use of additional land for the manufacture and storage of gas and residual products is authorized. The Order also provides for the purchase of the Boughton Blean Gas and Coke Company. Among the other clauses in the Order may be mentioned one prescribing a minimum charge of 25s. per quarter for any consumer having an electricity supply in his premises. (2) Hawkhurst Gas Order. By this, the local Company are authorized to construct and maintain additional gas-works, and to raise further capital not exceeding £6000. (3) The Peniston, Thurlestone, and Oxspring Gas Order authorizes the Company to raise additional capital not exceeding £6500, with borrowing powers of one-third of the total capital of the Company. The limits of supply are also extended. Powers to purchase additional lands are given, and a number of other Model Clauses are in the Order. (4) Wey Valley Water Order authorizes the Company to construct additional works, and to raise £40,000 of new capital.

*West Hampshire Water Bill.*—This Bill, which has been through the House of Lords, was last week ordered to be reported for third reading by the Unopposed Bills Committee of the House of Commons. It was explained that it was entirely a financial Bill, merely with the object of setting right some irregularities in the past in regard to the issue of stock. There was no suspicion attaching to any of these irregularities. The Local Government Board had reported to the effect that the Company should go to the expense of providing storage for water. In the other House, the Bournemouth Corporation petitioned against the Bill; and the whole of their evidence was entirely on this question. After a great many experts from all over the country had been called, the Committee declined to put the Company under such an obligation. The Company satisfied the House of Lords that the report had been drawn up under rather a misapprehension, because the Company's works were quite up-to-date. In consequence of what took place before the House of Lords, the Corporation had withdrawn their request for storage; but the Company had agreed, while the Bill was passing between the two Houses, to be put under the obligation to provide further filtration. The Chairman said he thought the question had nothing to do with the Bill; and how a petition of this character had been made upon it, he did not know.

## KINGSTOWN ELECTRIC LIGHTING ORDER.

### Position of the Alliance and Dublin Consumers' Gas Company.

### HOUSE OF LORDS COMMITTEE.—Tuesday, July 8.

(*Before Lord* NEWTON, *Chairman*, *Lord* LANGFORD, *Lord* CHARNWOOD, *Lord* WYNFORD, *and Lord* MORELL.)

The Electric Lighting Provisional Order Confirmation Bill (No. 6) included an Order granted to the Dublin Southern District Electric Supply Company, which was opposed by the Alliance and Dublin Consumers' Gas Company.

Counsel for the Order were Mr. VESEY KNOX, K.C., and Mr. MORGAN; while Mr. J. D. FITZGERALD, K.C., and Mr. C. H. G. CAMPBELL appeared for the Gas Company.

Mr. VESEY KNOX, in opening the case for the Order, said it was one authorizing the Dublin Southern District Electric Supply Company to supply electricity in Kingstown. The only opposition was that of the Gas Company; but he was going to submit that the Company had no *locus* to appear against the Order. Explaining the circumstances, he said that in 1896 the Town Commissioners, who were the predecessors of the present Urban District Council, obtained an Electric Lighting Order to which there was no opposition. The Local Authority, however, did not feel justified in risking the ratepayers' money in an electric lighting project, and an endeavour to get the Order taken over by a Company failed. Consequently, in 1904 the Board of Trade revoked the Order. In 1911, however, efforts were again made to induce private promoters to undertake electric supply in Kingstown, and eventually a Mr. W. M. Murphy, the Chairman of the Dublin United Tramways Company, was induced to go into the question, with the result that the Dublin Southern District Electric Supply Company was formed; and Mr. Murphy personally undertook, if an Order was granted, to find the necessary capital. Professor Tatlow was consulted; and he prepared a scheme for Blackrock, Kingstown, and Dalkey. For various reasons, Blackrock and Dalkey had to be cut out of the scheme, and the Board of Trade had granted the Order for Kingstown only. The Local Authority were quite satisfied with what the promoters had put forward, and, as already stated, the only opposition was from the Alliance and Dublin Consumers' Gas Company, who were at present supplying gas in Dublin and its suburbs, including Kingstown—a Company, he added, which was not one of the most successful of its kind in the United Kingdom. This opposition apparently was not based on competition between gas and electricity, but reference was made, in the Company's petition, to some words in an old Act of Parliament, dated 1866, in which it was stated that the Company was incorporated for working and maintaining gas-works and supplying gas "or other improved means of lighting" for public and private purposes, &c., and the contention was that Parliament had, so to speak, unawares—because electric lighting had not been introduced in 1866—given the Company not merely powers to supply gas, but also powers to supply electricity, by the use of the general words "or other improved means of lighting." The contention became ludicrous when it was remembered that in the Company's subsequent Acts they were expressly prohibited from supplying electricity, except for their own purpose, without the consent of the Board of Trade, and from applying their funds for the purpose of supplying electricity. In the Gas Company's petition the suggestion was made that special protection should be afforded for their mains, in the event of the Order passing; but it was not now the custom of Parliament to give further protection for gas or water mains than was provided by the general law, unless some special circumstance could be shown. As to competition, the Gas Company's petition did not appear to allege competition with the business now being carried on, but only with the business which the Company were authorized to carry on, presumably electricity, which, in fact, the Company were not authorized to carry on. A great point was made that no specific site for a generating station was mentioned in the Order. This was very common now that it was possible, since the passing of the Electric Lighting Act of 1909, for the Board of Trade to sanction the site. In the present instance, certain negotiations were going on for a number of sites, but no particular one had yet been selected. When the Gas Company lodged their objections with the Board of Trade, the Board did not consider them sufficiently serious to hold a local inquiry—evidently thinking it would be waste of time; and he would venture to suggest it would equally be a waste of the

Committee's time to hear the Gas Company now. He therefore asked the Committee not to grant *locus*.

Mr. FITZGERALD, in asking for *locus* for the Gas Company, said that promoters invariably said it would be waste of time to hear petitioners, especially where they had clear *locus*. He submitted that the Gas Company had clear *locus* in this case. They had their gas-mains laid throughout the district which it was now proposed to supply with electricity; and the point of competition was clearly raised in the petition. Then there was the possibility of the gas-mains being disturbed by the laying of the electric mains; and in the House of Lords this had always been held to be a sufficient cause for granting *locus*.

Mr. VESEY KNOX: You are protected by the General Clauses Act.

Mr. FITZGERALD said that in the House of Lords it had always been argued in the way he had stated; and he defied Mr. Vesey Knox to show a case to the contrary.

The CHAIRMAN, interrupting, said that Mr. Fitzgerald need not continue. The Committee would grant the Gas Company *locus*.

Evidence was then called in support of the electric lighting scheme.

Professor *W. Tatlow*, the Consulting Engineer to the Dublin Southern Districts Electric Supply Company, said he had prepared a scheme for Blackrock, Kingstown, and Dalkey; but Blackrock was cut out of it subsequently owing to the refusal of the Council there to agree with the Company's proposals, while Dalkey had to be cut out owing to a difficulty with the Board of Trade with regard to a purchase clause. One reason for the growing demand for electricity in Kingstown was that the gas supply was not so satisfactory as it used to be, and several private electrical installations had been put in. He estimated an average revenue of 8s. per annum per 30-watt lamp. There should be no difficulty in obtaining a site for a generating station. The plant would consist of two 110-kw. gas-driven generating sets, and one 30-kw. set. Generation would be at 3000 volts, with transmission by means of high-pressure mains to three transformer stations.

Mr. FITZGERALD, in cross-examination, put it to witness that the only proper method of dealing with this area was to have all three districts supplied from the one source, and that, consequently, the present scheme was an incomplete one. He also pointed out that the Blackrock Council were in favour of the Gas Company applying to the Board of Trade next session for an Electric Lighting Order, and, as a matter of fact, the Company had given notice to apply for all three districts. It was also put to witness that the only site in Kingstown available for a generating station was on the harbour, and that this was occupied by the gas-works. Consequently, there must be nuisance from the electric power station. Witness said he did not believe that the Kingstown Council would agree to the Gas Company applying for an Order for their district.

Sir *Thomas Robinson*, a past-Chairman of the Kingstown Urban District Council, gave evidence in favour of the Order, as did also Mr. *Michael Crowley*, who was called as a representative of Mr. W. M. Murphy, to repeat before the Committee the latter gentleman's undertaking to provide the necessary capital for the scheme.

This concluded the case for the Order.

Mr. *Francis T. Cotton*, the Secretary and Manager of the Alliance and Dublin Consumers' Gas Company, was then called as the first witness in support of the Company's opposition to the Order. He explained the history of the Company, and claimed a prior right to supply electricity in the Gas Company's area by reason of the existence of the words in their Act of 1866 already referred to by Mr. Vesey Knox. On more than one occasion schemes had been placed before the Board of Trade; but the latter held the view that the Company must proceed by a Provisional Order. Although this view was not concurred in by the advisers of the Gas Company, nevertheless it was proposed now to adopt the suggestion of the Board of Trade, and to apply for an Order for all three districts. He claimed that the Gas Company could supply electricity much more cheaply than a new company, inasmuch as the land and buildings for the generating plant already existed, as also did practically the whole of the staff. Further, the installation of electricity plant at the gas-works would not lead to any depreciation of property in a new district, as would be the case if a new generating station were erected. Beyond this, nuisance would be created in the streets by the necessity for carting coal from the harbour to the electricity works. So far as was known at present, the works would not be much less than 1¼ miles away from the harbour.

Mr. VESEY KNOX, in his cross-examination, put it to witness that his Company had only decided to proceed by Provisional Order when they knew that an Electric Supply Company was being formed. Witness stated that one factor in their opposition now was that the Dublin United Tramways Company, through Mr. Murphy, was really at the back of the present promoters, and it was an attempt on the part of the Tramways Company to become a competing lighting authority with the Gas Company. Hitherto the Gas Company had been successful in restraining the Tramways Company from supplying electricity except for their own purposes, and there was a clause in their Acts to this effect, which had been inserted at the instigation of the Gas Company. It was felt, however, that the Tramways Company were exceedingly anxious to become a lighting authority, and to compete with the Gas Company; and it was feared that the reason why no generating station had been scheduled in the Order was that an application might be made to Parliament in a future session authorizing the Dublin Southern Districts Electric Supply Company to take a supply in bulk from the Tramways Company. This would not be fair competition. The Gas Company felt that the complete scheme for Blackrock, Kingstown, and Dalkey was the only solution; and they would not go forward unless they had all three districts.

Mr. *W. Conen*, the Chairman of the Dalkey Urban District Council, spoke in favour of the Gas Company's complete scheme.

Mr. *A. E. Porte*, a Consulting Electrical Engineer, expressed the view that the Gas Company could undertake the supply more cheaply than a company who had to start by erecting a generating station. He also thought that if the new company erected a generating station and considerable distance away from the harbour, it would be certain to create nuisance of some sort. Further, the fact that on the map indicating the mains in the compulsory area there were several lengths of mains shown radiating from the tramway routes, suggested the ultimate design of taking a supply in bulk from the Tram Company.

Mr. *Michael Meares*, the Chairman of the Blackrock Urban District Council, said that a provisional agreement had been entered into with the Gas Company for the supply of electricity at 4¼d. per unit for lighting and 1¼d. for power.

Mr. FITZGERALD, addressing the Committee on behalf of the Gas Company, maintained that the only possible scheme for the district was one which would include all three areas, because Kingstown, being the most populous of the three, and being in the centre, once it was lighted by electricity, there would be no prospect for the other two on either side getting a supply. The Gas Company had given notice of their intention to apply to the Board of Trade for an Order for all three districts next session; and in view of their position as a flourishing gas concern, with every facility for giving a supply of electricity cheaply, the present Order should not be allowed to proceed.

Mr. VESEY KNOX briefly replied for the promoters, and argued that the Gas Company, although they claimed to have had these powers since 1866, had never made a serious attempt to put them into force until a separate Electric Lighting Company had been formed.

The Committee, after deliberation, decided that the Kingstown Order should proceed.

## PONTYPRIDD AND RHONDDA JOINT WATER BOARD BILL.

### HOUSE OF LORDS COMMITTEE.—Wednesday, July 9.

(*Before Lord* RIBBLESDALE, *Lord* LANGFORD, *Lord* FALMOUTH, *Lord* FALKLAND, *and Lord* HOOD).

The main object of this Bill is to authorize the Pontypridd and Rhondda Joint Water Board to enter into an agreement with the Merthyr Tydfil Corporation, whereby the latter will give a supply of water to the Joint Board; also to empower the Joint Board to construct additional works. The Committee proceedings in the House of Commons were reported in the "JOURNAL" for April 29 (p. 339).

Counsel for the promoters were Mr. J. D. FITZGERALD, K.C., Mr. G. M. FREEMAN, K.C., and Mr. REES WILLIAMS. The Merthyr Tydfil Corporation were represented by Mr. KEEN. The opponents were the Aberdare Urban District Council, represented by Mr. C. C. HUTCHINSON, K.C., and the Barry Urban District Council, represented by Mr. VESEY KNOX, K.C., and Mr. MOON.

Mr. FITZGERALD, in opening for the Bill, said that the main object was to confirm an agreement made with the Merthyr Tydfil Corporation for a supply of water in bulk. The Board had power to construct the Llia reservoir, in Breconshire; but it was not yet required, as the reservoir which the Merthyr Corporation were authorized to construct would supply sufficient water for the Merthyr consumers, and also hold a considerable surplus. Negotiations had been entered into between the Corporation and the Joint Board last year, which resulted in the agreement which the Committee were now asked to sanction. He pointed out that, owing to the district having coal mines, there was a great tendency for streams to disappear and get into the mines; and, in consequence, it was almost always necessary to have a certain supply to go beyond the district itself. In 1908, the Company then in possession of the district had been faced by this difficulty. The increase of population had been so continuous that the existing sources of supply were not sufficient in a dry season. In 1908, the Company applied to Parliament and obtained power to construct the Llia reservoir, which was a considerable distance away, at the cost of between £300,000 and £400,000. The Joint Board came into possession of the undertaking of the Company in 1911, and just at that time two schemes had been brought forward in Parliament for the purpose of obtaining a supply of water by constructing a very large reservoir at the head waters of the Taff stream, which flows down through the Board's district. The two schemes were competing ones between the Merthyr Corporation and corporations in the adjoining parishes. The Joint Board presented a petition, and argued that as the proposed water undertaking was at the head waters of the stream flowing through their district, they were entitled to share in any surplus proceeds. The result was that Parliament passed the scheme put forward by the Merthyr Corporation, and the others were thrown out. Parliament also inserted provisions in the Bill giving the Rhymney Water Company, who supplied the district, power to take a supply of from 2 million to 4 million gallons per day. A similar provision enabling them to take 2 million to 4 million gallons a day was inserted at the instance of the Barry Urban District Council; and also a further provision for Caerphilly, of 100,000 gallons per day. In the Bill as passed, however, no provision was made for the supply of water to the Joint Board. At the time it was thought that when the Merthyr Corporation had taken the water they needed for themselves, and had given a supply to the Rhymney Company, practically hardly any water would be left which could be relied upon for a supply in a dry season. Subsequent gaugings proved, however, that a much larger quantity than had been anticipated could be relied upon from the Merthyr reservoir, and, in addition to the supply to the Rhymney and Aber Company and the Barry Urban District Council, there would be a substantial surplus out of which the Joint Board's district could be supplied. Accordingly, last year negotiations were entered into between the Joint Board and the Merthyr Corporation, which resulted in an agreement which was scheduled to the Bill. It was obvious that it was the proper course for the Joint Board to pursue to get a supply from the surplus water of Merthyr, if proper terms could be arranged; and for this reason the Board had expended £341,000 in the taking over of the existing undertaking. If they were to carry out the scheme for the construction of the Llia reservoir, it would involve the further capital expenditure previously referred to—namely, £300,000 to £400,000. This would be a very heavy burden. It was much more economical to get a supply from Merthyr; and, on the other hand, it was to the advantage of Merthyr to be able to sell its surplus water. The Joint Board thus postponed the capital expenditure, and would not be required to construct the Llia reservoir or to raise the money for this purpose till the population of its district had reached such a point that the additional supply from Merthyr

would not be sufficient. Of course, with the increase in population there would be an increase in rateable value. The agreement in question was entered into on July 3, 1912. It provided that from and after the date upon which the Taf Fechan reservoir was completed and filled, the Corporation should deliver to the Board in perpetuity a minimum of 1 million gallons of water a day. This would amount to a revenue of £4500 a year to the Corporation. The maximum quantity to be taken by the Board was a further 2 million gallons—making 3 millions in all. With respect to the extra 2 million gallons, the Board would only pay for what they took, although they paid for 1 million gallons per day whether they took this quantity or not. The price to be paid by the Joint Board was 3d. per 1000 gallons. Under the Corporation's Act of 1911, a maximum supply of 8,100,000 gallons per day could be drawn by the Rhymney and Aber Water Company, the Barry Urban District Council, and Caerphilly; and under this agreement the Joint Board could not come before these in order of priority. Paragraph 10 of the agreement provided that if the Corporation were not able to supply everyone through an unavoidable cause, after the various bodies with the statutory rights, before mentioned, had been supplied, the remaining water was to be divided between the Corporation and the Joint Board as to five-eighths to the Corporation and as to three-eighths to the Joint Board. The reservoir was estimated to supply 14,500,000 gallons for three successive dry seasons; and taking this as the average, after the 8,100,000 gallons had been supplied to the bodies with statutory rights, there was a surplus of 6,400,000 gallons, 4 millions of which were to go to the Corporation and the remaining 2,400,000 to the Joint Board. Under this arrangement, the persons holding the statutory rights were safe, and the Merthyr Corporation and the Joint Board agreed as to the division of any residue between themselves.

In reply to the CHAIRMAN, Counsel said that if the Corporation could not give the supply, the Board would only pay for what they got. Continuing, he said with regard to paragraph 12 of the agreement, the object of this section was that as the estimated amount to be got in a series of dry seasons was 14,500,000 gallons, it became essential for any authority contracting with the Merthyr Corporation to see that the Corporation did not contract to supply more than they would produce in a dry season. The Barry Urban District Council, under the Act of 1911, had a statutory right to get from 2 million to 4 million gallons per day from the reservoir in question. It was conditional for Barry, however, to obtain powers to lay and construct mains from Barry up to the border of the Merthyr district, for the purpose of conveying the water to Barry; and there was always a possibility that they might not get these powers. Under the 1911 agreement, Barry was to promote a Bill for the purpose, either in the present session or last session; and it was promoted this session. Under the Borough Funds Act, however, the Urban District Council had to get the consent of the ratepayers to the Bill being promoted; and at a poll of the ratepayers all these provisions were struck out of the Bill. Accordingly, these powers were not obtained. This meant that there was a supply of 4 million gallons a day, which would have had the priority of the supply to the Joint Board, now went behind it. The Board, however, were not desirous of taking advantage of this position, and were perfectly willing to allow the agreement to stand just as it was, and to let the Barry Council negotiate for a new agreement between themselves and Merthyr. The Joint Board were perfectly willing to let Barry stand in the same position as before in relation to its priority of supply, if it could come to an agreement which the ratepayers would sanction. If not, the Board were also willing to let the Merthyr Corporation negotiate with anyone else for this supply, and put any such person in the position that Barry was to occupy. What the Joint Board asked Parliament to do was to carry out the agreement which both parties had come to, and in such a way that it could not prejudice the Merthyr Corporation or the Barry Urban District Council.

Mr. VESEY KNOX said his Council had reason to believe that they would be able to get the consent of the ratepayers.

Mr. FITZGERALD, referring to the position of the Aberdare Urban District Council, submitted that there was clearly no *locus standi* in their petition. The Council had not raised such a point in the other House, nor in the 1911 Bill. They had no right to object to the Board's agreement, and to say that they (Aberdare) must get a supply from Merthyr rather than from the Board.

Mr. HUTCHINSON remarked that in his opening speech, Mr. Fitzgerald had said that a large population could not be left without a supply of water. He now proposed, however, not only that the large population of Aberdare should be left without a proper supply, but that it should be cut off from a supply from Merthyr, to which Aberdare had a far greater natural right than any one of the interests it did supply. The amount of water at the disposal of Aberdare at present was only about 78 days' storage. He produced a circular which had been distributed to the inhabitants of Aberdare only last month asking them to economize in water, owing to the supply being so short. He submitted that the Merthyr Corporation should not go right down to the seashore to Barry when Aberdare was in such a state.

The CHAIRMAN suggested that the promoters had offered to take Aberdare into their arrangements.

Mr. HUTCHINSON said this was not so.

The CHAIRMAN pointed out that Mr. Hutchinson should make it clear that there was an obligation on the part of Merthyr to supply Aberdare.

The Committee then deliberated in private on the question of *locus standi* being allowed; and when the parties were re-admitted,

The CHAIRMAN announced that Mr. Hutchinson could not be allowed this.

Mr. *W. R. Nicholas*, the Solicitor to the Water Board, was then called to give evidence in support of the Bill. He stated that although the Llia reservoir was not necessary at present, the Board still wished to keep alive their powers with regard to it.

In cross-examination by Mr. KEEN, witness expressed the same views as Mr. Fitzgerald in relation to the Board agreeing to Merthyr contracting with anyone in the place of Barry up to a maximum supply of 4 million gallons per day. Counsel, however, pointed out that there was a risk of the Merthyr Corporation not being able to contract on such favourable terms as the agreement with Barry, both as regards the minimum quantity and the price to be paid—namely, 3d. per 1000 gallons. The agreement with the Joint Board was on the condition that the Barry agreement was subsistent, and Counsel argued that if the strict legal position was insisted upon, as the Barry agreement was not subsistent, then the Board's agreement under the Bill was already gone. But witness would not agree that this was the case. Witness said that apparently Merthyr wanted to do away with what he regarded as the reasonable provision that it could not at any time sell more than 14,500,000 gallons per day. It was stated by Mr. Keen that if the Merthyr Corporation were to lose the supply to Barry, as the minimum was 2 million gallons a day it would mean a loss of £9000 a year—this being on the ground that Barry never took more than the minimum quantity. The Merthyr Corporation were prepared to put the Board in the second place, where Barry should be if their agreement was put in, so as to enable them to supply beyond the limit of 14,500,000 gallons per day.

Mr. *Hill*, of Messrs. G. H. Hill and Sons, who acted for the Pontypridd Water Company when they sold their undertaking to the present Board, confirmed the evidence given by the previous witness. He also emphasized the point that it was essential to have a limitation on the sale of the water, as it was undesirable to have less water than was needed. Therefore, clause 12 of the agreement should stand in spite of the new position with regard to Barry.

Mr. KEEN, in cross-examination, pointed out that the Board have powers to build the Llia reservoir, and that this, if constructed, will yield 3,000,000 gallons per day. Witness estimated that the Llia reservoir would need to be constructed in twenty years, and that the cost of construction now would be considerably more than when the powers were granted, and which were in the parliamentary estimate, owing to the increased cost of materials.

This concluded the case for the promoters.

Mr. *F. D. Simons*, the Chairman of the Law and Parliamentary Committee of Merthyr Tydfil, then gave evidence. On the question of the limitation of 14,500,000 gallons per day, he said he would agree to an "average" of this quantity for a specified period, owing to any fluctuations which might occur in the quantity needed.

The CHAIRMAN suggested that, subsequent to the agreement with the Joint Board, Merthyr had had offers of business which it preferred very much to anything under the existing agreement, and that as a business man Mr. Simons wanted to get out of the agreement and make new arrangements. But witness denied that he wanted to get out of any agreement.

Mr. *W. H. E. Binnie*, whose firm constructed the reservoir of the Merthyr Corporation, gave evidence to the effect that it was expected to get 1½ to 2 million gallons more water from this than was shown in the parliamentary estimate. He stated that the supply of the stream on which the reservoir would be constructed would average, in a dry summer, upwards of 16 million gallons. He therefore thought 14½ million gallons sufficient security.

Mr. KEEN, addressing the Committee on behalf of the Merthyr Tydfil Corporation, said that the order of priority of supply for the different bodies was first Merthyr, the Rhymney and Aber Company, Barry, and then all the others. He again emphasized the serious loss to the Merthyr Corporation if the Barry agreement was cancelled.

Mr. VESEY KNOX, for the Barry Urban District Council, said that it seemed to be taken as granted that Barry had fallen out of the agreement for supply from Merthyr; but this was not so, either legally or in fact. He pointed out that in the poll on the Bill which was to be promoted by Barry much less than half the number of ratepayers voted; and it was the majority of these who voted against the Council expending the large sum necessary for the laying of mains to the Merthyr district. It had been suggested, however, that Barry should now pay 4½d. per 1000 gallons supplied, instead of, as originally, 3d., on condition that the Merthyr Corporation bore the cost of laying the mains. This seemed to be a reasonable provision; and the promoters were willing in principle to agree to some such clause. He asked two years in which to enter into this supplemental agreement.

The room was then cleared, and on re-admittance,

The CHAIRMAN announced that the Bill might proceed, provided that it should be made clear by some words that, if Barry goes out of the agreement, the 4 million gallons which was the maximum to be supplied to Barry became saleable. As to the Barry clause, this, he understood, was agreed between the Council and the promoters.

Mr. VESEY KNOX: The principle.

The CHAIRMAN pointed out that nothing in the Barry clause must interfere with the rights of the Merthyr Corporation to sell this 4 million gallons until the Barry Council came into the agreement, as the sale of this quantity of water could not be kept waiting for Barry.

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**Thursday, July 10.**

This morning the Committee sat for the adjustment of clauses. The only new clause put into the Bill was the one concerning the agreement between the Barry Urban District Council and the Merthyr Tydfil Corporation, which reads as follows:—

> If the agreement dated the 29th day of May, 1911, set forth in Part II. of the Third Schedule to the Merthyr Tydfil Corporation Water Act, 1911, be cancelled or cease to have effect, nothing in this Act, or the agreement set forth in the schedule to this Act, shall prevent the Corporation from supplying to the Barry Urban District Council, or to any other local authority, body, company, or person, or partly to such Council and partly to any such other authority, body, company, or person, the quantity or quantities of water mentioned in clause 3 of the said agreement of the 29th day of May, 1911; but such quantity or quantities of water shall not exceed in whole or in any part, or in any one day, the respective quantities of water which, under such clause, the Barry Urban District Council would have been entitled to require. And any water so supplied shall take the priority given by sub-section 3 of section 48 of the Merthyr Tydfil Corporation Water Act, 1911, and to the supply intended to be given by the last-mentioned agreement.

Mr. PARKER (Messrs. Sharpe, Pritchard, and Co., Parliamentary Agents), on behalf of the Merthyr Tydfil Corporation, proposed that

after the words "in clause 3 of the said agreement of the 29th day of May, 1911," to insert "in perpetuity or for any term or terms of years," so that the clause would read "the quantity or quantities of water mentioned in clause 3 of the said agreement of the 29th day of May, 1911, in perpetuity, or for any term or terms of years," &c.

Mr. FITZGERALD, on behalf of the Joint Board, said that he agreed with this.

In answer to the CHAIRMAN, he said that, under the present Barry agreement, a price was named. He understood the position of Barry was that the Council thought the agreement had lapsed, as he himself had done. He now understood that Barry had been advised that it had not lapsed, and if it had not, then the price stood. If they were negotiating a new agreement the question of price would be open.

## MIDDLESBROUGH EXTENSION.

### Gas Companies' Opposition.

### HOUSE OF COMMONS COMMITTEE.

(*Before Colonel* BATHURST, *Chairman*, *Sir* GEORGE AGNEW, *Mr.* O'DOHERTY, *and Mr.* SAMUEL SAMUEL.)

What promises to be a lengthy inquiry is now taking place before the above Committee in connection with a proposed extension of the Borough of Middlesbrough. There are several opponents – including the North Ormesby Gas Company and the South Bank and Normanby Gas Company, who, as reported in the "JOURNAL" last week, were recently granted *locus* by the Court of Referees.

Counsel for the Bill were Mr. BALFOUR BROWNE, K.C., Mr. W. J. JEEVES, and Mr. W. HEDLEY. The South Bank and Normanby Gaslight and Coke Company were represented by Mr. CLODE, K.C., and Mr. NIXON; while Mr. G. W. BAILEY appeared on behalf of the North Ormesby Gas Company.

Mr. BALFOUR BROWNE, in opening, said that the Bill was a Local Government Provisional Order Confirmation Bill (No. 18), and it included an Order for an extension of the borough boundaries of Middlesbrough. The Order was made after a long local inquiry in January this year. The proposal was to take in the greater portion of the districts of Ormesby and Normanby. Dealing with the gas opposition, Counsel said that gas was supplied in Middlesbrough by the Corporation, whose works contained a considerable amount of surplus plant. The total capacity of the works was 900 million cubic feet, whereas at the present time the sales were about 500 millions. The price was 3s. per 1000 cubic feet, with a discount of 10d., making the net price 2s. 2d. In the two districts proposed to be added were Gas Companies whose prices were necessarily much higher, and they were both petitioning against the Bill. The Ormesby Company were supplying at 3s. 10d., with a discount of 10d.; making a net price of 3s., as compared with 2s. 2d. in Middlesbrough. The South Bank and Normanby Gas Company were supplying at 4s. 1d., with a discount of 10d. He believed these were the figures; in any event, the price was higher than in Middlesbrough. This Company also charged meter-rent. If the proposed extension of area took place, it was not intended to disturb or confiscate either of the Companies. It was in order to make this certain that clause 11 had been inserted, which read as follows:

> Nothing in the Order shall alter or affect the limits of the Corporation for the supply of gas under section 31 of the Middlesbrough Extension and Improvement Act, 1866, as altered by sections 5 and 28 of the Middlesbrough Extension and Improvement Act, 1874. Nothing in this Order shall prejudicially affect the powers, duties, and liabilities of the North Ormesby Gas Company, Limited, or the South Bank and Normanby Gaslight and Coke Company, Limited.

The object of this clause was to leave the position precisely where it is to-day. He admitted, however, that if the Corporation obtained the extension there would exist the anomaly that the people in the old borough would be paying 2s. 2d. for their gas, while residents in Ormesby would be paying 3s. He believed that in the end the probable result would be that a time would come when the two Companies would be bought up. The reason why he emphasized the point that he wished to leave the position exactly where it is, was that the Middlesbrough Corporation, under the Act of 1866, had powers to supply gas in both the areas proposed to be added—indeed, both Companies were started with the knowledge that the Corporation were seeking such powers. The Corporation could supply in Ormesby, for instance; but there was a clause—not for the benefit of the Gas Company, but for the benefit of the Urban District Council of Ormesby—to the effect that the Corporation could not lay mains in Ormesby without the consent of the Ormesby Council. In Normanby, no such restriction was put upon the Middlesbrough Corporation. The only thing the Companies could say was that the Corporation had the powers but had never exercised them, and that the Companies were actually supplying. This was quite true; and he did not suppose that the Middlesbrough Corporation ever intended to compete with the Companies. At the same time, it was important to leave the Middlesbrough Corporation in possession of their existing powers for this reason. There had been talk of purchasing the undertakings of the Companies; and when they did come to be purchased, the arbitrator would probably first ascertain the maintainable revenue, and then multiply it by a figure as representing a number of years' purchase, and the number of years would vary according to the circumstances. For instance, if it were an absolute monopoly, there would be a larger number of years' purchase than if it were not, because the security would be better. If, on the other hand, there was active competition, and the Company's trade was going down, it would be a smaller number still. When the Corporation came to purchase the Companies—if they ever did—it would have to be by another Act of Parliament; and he would have the right to say that, although it was quite true the Company had a certain revenue, it was not absolutely secure, because, under the Act of 1866, Parliament gave the Middlesbrough Corporation the power to lay pipes and supply gas in Ormesby with the consent of the Local Authority, and in Normanby at any time they pleased. Therefore, he should say to the arbitrator that, while it was quite right that he should consider the Company's revenue, nevertheless it was not so well secured as if the Company had an absolute monopoly. The whole object of the Gas Companies' opposition was to try and get the Committee to say that they should have an absolute monopoly, and that the Corporation's powers under the Act of 1866 should be repealed. It was for this reason that he had introduced into the Order the clause he had read, with a view to maintaining the present position, because he deprecated anything being introduced into the Order which would clothe the Companies with powers they did not already possess. He thought the time would come when the people in Ormesby and Normanby would ask for gas as cheaply as was supplied in Middlesbrough; and when that time arrived, the Corporation would come with a Bill and give the Companies full compensation for the value of their works. He did not, however, want them to be in any better position than they were to-day.

Mr. *W. Harkess*, a Past Mayor of Middlesbrough and a Tees Conservancy Commissioner, was the first witness.

Mr. BAILEY, in cross-examination on behalf of the North Ormesby Gas Company, suggested that if the veto of the Ormesby Council over the laying of mains by the Corporation was to be taken away by the Order, it should be handed over to the Gas Company, or some protective power should be given to the Company which would maintain the present position. Witness said he saw no objection to the Company being protected in some way, so long as it did not tend to enhance the value of their undertaking. If the present Order were passed, there would undoubtedly have to be some equalization of the gas prices in the whole district, and then the Corporation would be willing to treat on broad lines the question of taking over the Company's undertaking. If he could be satisfied that the transfer to the Company of the veto of the Ormesby Council over the laying of mains would not enhance the value of the Company's undertaking, he would agree.

Mr. JEEVES said the promoters would be happy to consider a purchase clause.

Mr. CLODE, for the South Bank and Normanby Company, said he had nothing to do with the North Ormesby Company, and was not going for purchase on any terms whatever.

Mr. BAILEY remarked that neither was he, unless he was driven to it.

Mr. SAMUEL SAMUEL (a member of the Committee), in the course of a few questions, said that if the Corporation took over Ormesby, they might conceivably lay mains there in order to depreciate the value of the Gas Company's property. They might even threaten to do so unless the Company sold on the Corporation's terms. Corporations did not always have in mind the interests of the ratepayers; and Middlesbrough might spend a lot of money with the object of depreciating the value of the Company when it came to a sale.

*Witness* said he did not think the Corporation should be allowed to depreciate the value of the Company's property; but, on the other hand, the Company should not be allowed to increase the value of their undertaking over what it was now, in consequence of the passing of this Order.

Alderman *Amos Hinton* was the next witness; and Mr. NIXON, on behalf of the Normanby Gas Company, pointed out to him that, so far as water supply was concerned, the immediate effect of the transfer would be to increase the Company's water bill from £39 per annum to £67.

## Paris Water Supply Scheme.

According to a paragraph in the "Engineer," the water famine in Paris two years ago was so serious that several schemes for tapping new sources of supply which would render any further dearth practically impossible were brought under consideration. After examining all the different projects, including one for bringing water from the Lake of Geneva, the Prefect of the Seine has recommended the Municipal Council to adopt the scheme for building an aqueduct to tap the subterranean water in the Val de Loire between Gien and Nevers, whereby it would be possible to bring to Paris 220 million gallons a day. The Paris engineers propose to construct large reservoirs which would serve to regulate the level of the Loire. The capacity of these reservoirs would be about 44,000 million gallons. It is believed that the estimated cost of £16,000,000 will be largely exceeded. The Prefect of the Seine nevertheless considers that this is the only practical scheme capable of satisfying the requirements of the capital.

## Sale of Stocks and Shares.

At the Mart, Tokenhouse Yard, E.C., last Tuesday, Messrs. A. & W. Richards sold, by order of directors and executors, stocks and shares in various companies, including a new issue of capital. This was by the Southend Water Company, who offered some £10 new ordinary shares, ranking for a maximum dividend of 5 per cent., but carrying 4½ per cent.; and they fetched from £9 to £9 2s. 6d. each. Under instructions from executors, £1210 of the ordinary 4 per cent. stock of the Gaslight and Coke Company, the last dividend on which was at the rate of £4 17s. 4d. per cent., realized from £99 10s. to £100 per £100 of stock; the purchaser taking the half-year's dividend accruing from the 1st of January last. Under similar circumstances, offers were invited for £500 of additional ordinary 7 per cent. stock of the Southgate and District Gas Company; and it was all sold at £134 per £100. A parcel of £10 ordinary 10 per cent. shares in the Houghton-le-Spring District Gas Company (last dividend at the rate of 3¾ per cent.) fetched £5 each. A few £10 ordinary shares in the Danish Gas Company, the dividend and bonus on which for the year ended June 30, 1912, were at the rates of 9 per cent. and 1 per cent. respectively (the final dividend and bonus being tax free), were all sold at £18 apiece—the purchaser taking the final dividend and any bonus that may be declared.

# LEGAL INTELLIGENCE.

## Action against the Metropolitan Water Board.

In the Shoreditch County Court, last Tuesday, before his Honour Judge Cluer, Mr. Henry John Aris, of the Railway Tavern, Dalston Lane, sued the Metropolitan Water Board to recover £35 13s. 8d., the damage done to a cob through it catching its foot in a hole in Woodland Street, owing to the bursting of a water-main. The plaintiff's case was that he was driving his cob when it caught its foot in the hole, which was not visible as he came along. He tried the depth of the hole afterwards, and found it to be 9 inches, and full of water. For the defence, Mr. Ross Brown said it happened that the plaintiff was altogether wrong in his particulars of claim, as the water-main had not burst at all; the injury having occurred in the communication pipe from the main to a house, the owner or occupier of which was liable. He had a number of cases on the point; and though the matter was rather complicated, he thought he would be able to prove that defendants were not liable. As a fact, none of the men employed by the Board had anything to do with the repair of the hole, and, as was the case with most holes in the road, the local authority saw to the matter. A turncock in the employ of the defendants said he was of opinion that the foot of the horse smashed in the crust of the road, which had been undermined by the running of the water. He found the fault was in the communication-pipe. This had nothing to do with the Board, so he served a notice on the occupier of the house, who sent for a plumber and had the matter attended to at once. If it had been a main pipe burst, he should have immediately fenced in the road; but the Board had no authority over communication-pipes. Judge Cluer agreed that this pipe had nothing to do with the Board. It did not belong to them. Mr. Thomas (for the plaintiff): But it must be something to do with the Board, as they have actually sent in some charges in connection with this very case—turncock's time, &c. Who is it takes the responsibility? Judge Cluer: I can see no duty on them to do something to a pipe not belonging to them. Mr. Thomas: There is an initial duty on the Board to see where the leakage occurs – they being the only proper people to interfere. Judge Cluer: All they did was to search to see if their water was being lost, either out of their main or out of the occupier's communication-pipe; and on finding it to be the latter, they served him with a notice tantamount to saying "You must prevent the waste of our water." It was no concern of theirs how the occupier carried out the work; they were only concerned in seeing that the water was not wasted. Because they used every possible care to see that there was no waste, it did not make them in any way liable for damage done by a pipe belonging to someone else. There would have to be a verdict for the defendants, with costs. Leave to appeal was granted.

## A Novelty in "Slot" Prepayment.

Evidence given in a case heard by the Nottinghamshire Magistrates sitting at Mansfield last Thursday revealed an amazing, if also an amusing, practice which was alleged to have been countenanced locally in regard to "slot" meter prepayment arrangements. Proceedings had been instituted by the Kirkby Urban District Council against a defendant named Richard Smith for fraudulently abstracting gas; and it transpired that, in lieu of the usual coppers, bone rings from babies' feeding-bottles had often been utilized for the purpose of obtaining the necessary supply of gas. The suggestion, indeed, was that it was a common practice, and that when payment was called for pennies had been accepted in proportion to the number of rings found. The collector admitted, in reply to the defendant's query, that he had discovered similar rings in the meters on previous occasions, and had accepted coppers for them. It was a common practice, the witness added, to allow this to be done, if the money was paid straight away. A woman who succeeded defendant in the tenancy of the house proved that he had asked her if the gas man had called, and had given her 4d. to take to the office; but the officials there would not accept it. Mr. E. B. Hibbert, the Clerk to the Council, who prosecuted, contradicted the collector's statement that the practice was sanctioned by the Local Authority. The Gas Manager (Mr. G. M. Gribble) declared that the practice was not an officially understood thing; but he admitted that it was "a small leniency or privilege extended to customers." They knew very well, however, that it was not a right thing to do. The evidence appeared to leave no alternative to the Magistrates but to dismiss the case; and this they immediately did.

## Gas at the Royal Sanitary Institute Congress.

At the exhibition held last week at Exeter in connection with the congress of the Royal Sanitary Institute, the Exeter Gas Company had a very comprehensive exhibit of gas appliances for the home. They showed fittings for the drawing-room, dining-room, kitchen, and scullery; and in a fitted-up bath-room they demonstrated the principles of hot-water circulation, and showed an instantaneous water-heater for baths and lavatory basins. For their exhibit they were awarded a silver medal. Not only were the visitors and residents shown the various kinds of gas appliances, but the value of gas in domestic operations was emphasized by suitable articles in the local papers. Two dealt with the claims of gas as an illuminant; another showed how, by its aid, hot water can be readily obtained without work; while others furnished proof of its value in solving the servant problem by pointing out that with the kitchen always clean and sweet, as it is when all the cooking and water heating is done by gas, both servant and mistress are satisfied.

Clark's Syphon Stove Company, Limited, have recently designed the "Dart" water-heater, some illustrated particulars in regard to which are furnished in a small pamphlet of which they have sent us a copy. It is on the "open" chamber principle, but has a water-jacket rendering it cool in use. It is claimed by the makers that it will deliver 2 gallons of hot water per minute from the time of lighting the gas.

# MISCELLANEOUS NEWS.

## GAS SUPPLY OF PARIS.

### Annual Report of the Gas Company.

The Directors of the Company formed to carry on the gas supply of Paris in association with the Municipality, presented their fifth report at a meeting of shareholders recently held. It covered the twelve months ended the 31st of December last; and the following are its principal features.

GENERAL STATISTICS.

The quantity of gas sent from the works in the period referred to was 471,330,543 cubic metres, or nearly 16,638 million cubic feet; being an increase of 18,785,529 cubic metres, or about 663 million cubic feet, on the output in 1911. The day consumption reached 207,694,640 cubic metres, or 7331·6 million cubic feet; being an increase of 5,298,050 cubic metres (187 million cubic feet). The quantity of gas sold was 448,725,346 cubic metres (15,840 million cubic feet), or 4·72 per cent. more than before. The revenue from the sale of gas amounted to 87,755,398 frs. (£3,510,216), or an increase of 4·73 per cent. The number of consumers on the books at the close of the year, compared with 1911, was—

| | Ordinary. | Free-Fittings. | Total. |
|---|---|---|---|
| 1911 . . . . | 371,588 .. | 302,148 .. | 673,736 |
| 1912. . . . . | 389,874 .. | 303,904 .. | 693,778 |
| Increase. . . | 18,286 .. | 1,756 .. | 20,042 |
| Do. per cent. . | 4·92 .. | 0·58 .. | 2·97 |

For the public lighting of the city there were in use on Dec. 31 last 58,838 burners, compared with 57,781 at the close of 1911. They were divided as follows: Ordinary, 1239; incandescent, 57,599—a decrease of 1 of the former, and an increase of 1058 of the latter. Since the last report there has been a considerable extension of high-pressure gas lighting in the city. On Dec. 31, 1911, there were in use in the public thoroughfares 368 light-centres, having a total illuminating power of a million decimal candles; whereas at the close of last year the number had been increased to 670, representing the light of 1,536,000 decimal candles. This system of lighting is in course of installation on the Place de la République and the Boulevard St. Germain; and the Municipal Council have decided to extend it to some of the important thoroughfares.

The number of rising pipes for the supply of tenements in use at the close of last year was 57,176, against 52,219 on Dec. 31, 1907, very soon after the Company took possession—an increase of 4957; the consumers taking their supply from them numbering 562,799, compared with 449,662 at the earlier date, or 113,137 more. The increase in the year was 18,966. The length of mains laid up to Dec. 31 last was 1,977,201 metres, or about 2,174,920 yards; being an increase of 48,768 metres, or 53,645 yards, in the twelve months. Since the Company have been in possession, the mains have been extended by 236,993 metres, or 260,690 yards.

Coming to the financial portion of the report, it is stated that, in addition to 87,755,398 frs. (£3,510,216) received from sales of gas, the residuals, meters, fittings, &c., produced 21,283,792 frs. (£851,352); making together 109,039,190 frs. (£4,361,568). The expenses for the year, including 1,586,842 frs. (£63,474) taken by the Company by way of remuneration, came to 85,578,374 frs. (£3,423,135); so that there was left a balance of 23,460,816 frs. (£938,433), which passes into the hands of the Municipality, compared with 22,007,397 frs. (£880,296) for the year 1911—an increase of 1,453,420 frs. (£58,137), or 6·6 per cent. It is explained that this increase, which was realized notwithstanding heavy supplementary payments in the way of salaries to employees taken into the Company's service, is due to improvements made in the manufacturing operations, as well as to additional sales of gas, coke, and residual products—the latter having been disposed of at higher prices than those obtained in the preceding year. It has already been mentioned that the quantity of gas sold last year was 4·72 per cent. more than in 1911. The Directors regard this increase as very interesting in connection with an undertaking which has already on its books, in round numbers, one consumer for every four inhabitants.

PROPAGANDA WORK.

Great activity continues to be displayed by the Directors in extending the use of gas, either by obtaining new customers or by inducing those already existing to increase their consumption. With this object in view, they have developed the system of putting prepayment meters in small tenements, and have thereby caused gas to be employed in places where it had not previously been in use. Moreover, there has been a gratifying increase in the number of bakers who use gas for heating their ovens. In collaboration with the Bakers' Syndicate in Paris, the Directors carried out last year a number of interesting comparative experiments on the use of coal, wood, and gas for the purpose named, with the result that they were able to demonstrate the unquestionable advantages offered by the employment of gas for making bread.* In order to stimulate the use of gas for culinary purposes, the Directors opened a kitchen for cookery demonstrations; and the uninterrupted influx of visitors bore testimony to the interest which the experiments carried on there aroused in the general public, who were able to obtain the fullest information in regard to the latest appliances, and profit by the courses of lectures given by thoroughly competent specialists. With the approval of the municipal authorities, the Directors are making a trial of letting radiators on hire, without charge for fixing, to encourage their use for domestic heating. This innovation has been cordially welcomed; and already results have been obtained which justify the expectation that the system will extend. In

* An account of the experiments referred to will be found in the paper read by M. Rouland, the Managing-Director of the Company, at the last meeting of the Société Technique du Gaz en France, a translation of which was given in the "JOURNAL" for the 24th ult. (p. 1007).—ED. J.G.L.

the domain of lighting, the efforts of the Directors are continually being directed to making the public appreciate the facility with which gas can be employed in the most varied ways. Lighting by compressed gas has extended from the public thoroughfares into private use for the lighting of cafés, restaurants, and large halls; while lighting by inverted burners is making good progress for the interior of dwellings.

EXTENSIONS OF MAINS AND PLANT.

In the course of last year, the Directors were actively engaged in carrying out the scheme for new works prepared by the Company and approved by the Municipality. Important extensions of mains were completed and others commenced. With regard to the works, the additions to the station at Le Landy are coming to an end. There is now in progress the construction of a third gasholder of about 5¼ million cubic feet capacity, as well as a special fire-brick factory. At the adjoining new Cornillon station, the excavations for two large holders, each of about 8 millions capacity, have been commenced. The productive power of this station, which was originally arranged for about 25 million cubic feet per day, has been increased to 32¼ millions. The retort-houses will shortly be put in hand. They will contain chamber ovens of 7 tons capacity. The works will be equipped with the most up-to-date plant in every department, including a central electricity station, electro-mechanical appliances for the transport of coal and coke, condensing and purifying plant, &c. The two stations will receive their coal simultaneously by rail and by water; and a wharf equal to the discharge of 4000 tons of coal per 24 hours is now being erected. The reconstructed and enlarged station at La Villette will have a productive capacity of close upon 16 million cubic feet per day—being 1¾ millions more than that of the old station. When the series of works planned to be carried out at the three stations just named are completed, the Company will be in possession of a group of modern works having a total daily productive capacity of about 73 million cubic feet, apportioned as follows: Le Landy, 24·7 millions; Le Cornillon, 32·3 millions; La Villette, 16 millions.

RESULT OF THE YEAR'S WORKING.

The net profit made by the Company for the year was 1,765,786 frs. Deducting 5 per cent. from this for the legal reserve, 88,289 frs., there was left a sum of 1,677,497 frs. Adding the amount brought forward, 219,698 frs., there was produced a disposable balance of 1,897,195 frs. (£75,888). The Directors recommended the distribution of 1,650,000 frs. in the payment of a dividend of 5½ per cent. for the year; leaving 247,195 frs. (£9888) to be carried forward. The report and accounts were adopted, and the dividend recommended was declared.

## AN INQUIRY AT LIMERICK.

### The Working of the Gas Undertaking.

It was stated in the "JOURNAL" a few weeks ago that the Limerick Corporation had adopted a resolution re-affirming their demand for a sworn inquiry by the Irish Local Government Board into the working of the gas undertaking for the past ten years. The demand was acceded to, and an inquiry was opened last Tuesday, in Limerick, by Mr. J. W. DRURY, the Chief of the Auditing Department.

Mr. P. KELLY (for the Corporation) at the outset dealt with the legal relations between the Gas Committee and the Corporation.

Mr. DRURY said he assumed that the Committee, being a general Committee of the Corporation working the property of that body on their behalf, were bound by the same Acts of Parliament as the parent body.

Mr. KELLY said the Committee was an independent entity, formed by force of a special Statute, and that at the will of the Corporation, a portion of the Committee, he explained, was elected by the Corporation and a portion by the gas consumers; and they did not accept contracts under seal, but always independent of the Corporation. In other words, they were subject to the general control of the Corporation, but were a *quasi*-independent body for administrative purposes. There had, for some years back, been a good deal of criticism which was adverse to the working of the gas undertaking—generally in respect to the management of the concern by the Gas Committee, and more particularly in respect of the contracts made for the supply of coal for the Committee. A Special Committee of the Corporation held an inquiry, the scope of which extended from March, 1902, to March, 1912; and the inquiry itself lasted from June of last year to January of the present year, during which period all the books, returns, &c., of the Gas Committee were the subject of investigation. On the report of the Special Committee, this sworn inquiry by the Local Government Board was asked for.

Alderman *D. M'Neice*, a member of the Special Committee, was the first witness. Dealing with coal contracts in 1904, he said that in May the Gas Committee accepted a tender of Messrs. Bow and Gilmour for Kinnel gas coal at 17s. 3d. and 16s. 3d. per ton for screened and unscreened respectively; the supply being 1000 tons. In July there were about sixteen tenders for supplies, 900 tons for one year or 1800 tons for two years; and a tender of Messrs. Power was accepted for the first time. It was decided to buy a cargo of Messrs. Power's Standish Arley coal at 17s. 8d. a ton. The tender was not the lowest. On March 7, he pointed out, the Committee secured a trial cargo of Wharncliffe Silkstone coal; and in May they obtained another trial cargo of coal from Messrs. Bow and Gilmour. He contended that at the July meeting the Engineer was not asked for the results of the trials of these two coals, but that there and then a trial cargo was decided upon from Messrs. Power, at 18s. 2d. a ton, and there was also a Kinnel order at 16s. a ton.

Mr. P. J. O'SULLIVAN (for the Gas Committee) said he would satisfy the Inspector that there were reports to the Committee.

*Witness* said that on July 25 the Engineer submitted two days' working trial of Messrs. Power's Standish Arley coal. The report stated that, as the results were obtained under unfavourable circumstances, the Engineer would like to make a further trial. It was agreed that there should be a seven days' trial; but the minutes showed no result of this at the next meeting. At an August meeting, the Committee were satisfied with the result of the trial, and accepted Messrs. Power's tender for 900 tons. The Inspector would see that there was a report as to this trial cargo, but none as to the two previous trials. The Engineer was to have made a weekly report as to the number of tons of coal carbonized and the quantity of gas made from the coal, and also the amount of gas the coals made per ton for the week. Witness held that only a six days' test had been made, instead of one of seven days. The inference was that the contractor's men refused to store the coal according to the contract terms. There was no explanation in the minutes of why Standish Arley coal was taken in 1904 and discontinued in 1907, and another coal taken. It was injurious to the gas undertaking for one firm to have a monopoly for the supply of coal. For 1912, the results were less than in the previous year. The coal carbonized was Tucker, save one cargo of Silkstone, for which there was no contract. Messrs. Power's tender for 10,000 to 12,000 tons was accepted at £1 os. 4½d., which was not the lowest tender received, as there was one from another firm to supply 5000 tons at 16s. 9d. and 4000 tons at 16s. 3d. When Mr. Timothy Ryan was Mayor of the city, he and Mr. W. Holliday were members of the Gas Committee. Mr. Ryan was Manager of Messrs. J. P. Evans and Co., Mr. Holliday was Managing-Director of Messrs. J. & E. Boyd; and tenders of both firms were accepted for supplies to the gas-works. Mr. Ryan tendered for printing work on behalf of Messrs. O'Connor and Co., of which firm he was a member. Witness had no interest in the gas-works, except as a member of the Corporation; and he had no animus against the members of the Gas Committee, or any of their employees. He was not connected with the coal trade.

In reply to Mr. O'SULLIVAN (for the Gas Committee), witness admitted that when Mr. Hawkins was appointed Engineer, a considerable amount was spent in putting the gas-works into a proper state of efficiency. It was a fact that the Gas Committee were £4600 in debt in the financial year ending March 31, 1902, and he accepted a statement that there was a credit balance of £8269 for the financial year ended in March, 1911. In ten years, the financial position had been changed by over £12,000, and the price of gas had been reduced from 4s. to 3s. 8d. per 1000 cubic feet—the Gas Committee paying in money and free lighting about £5268. But he did not know whether there had been an increase of £1000 in wages since 1902. In 1911 and 1912, the coal gave satisfactory results. He thought the gas undertaking was now in a good condition. Pelaw Main was, he said, the coal used prior to the period which he questioned.

Mr. *M. Griffin* deposed that in March, 1912, he discovered that the Gas Committee had lent 103 tons of coal out of stock to the contractors, Messrs. Power. He was told that the contractors often obliged the Committee, owing to delay in the arrival of coal boats through stress of weather. When the Engineer last year was warned to make provision against the risk of a strike, Messrs. Ryan and Holliday took it on themselves to order 490 tons from the Limerick Steamship Company at a figure which meant a loss of £435 15s. 11d. According to the Engineer, Messrs. Power had then 200 tons of coal.

Mr. *M. O'Brien*, who was next examined, asked whether he could use a statement made to him by members of the Corporation and of the Gas Committee.

The INSPECTOR told him he could do so at his own risk.

Mr. *O'Brien* said in that case he would not trouble.

Mr. KELLY said charges made by the witness as to the coal supply did not represent the views of the Corporation. No charge was made against Messrs. Power with regard to screened or unscreened coal.

Mr. *T. Donnellan* expressed the opinion that the Gas Committee should be increased to a membership of twelve He put forward the view that unscreened coal was quite suitable for gas production.

Mr. *P. Bourke* said a tender of his for certain work at the gas-works had been rejected, as it was not made on a proper tender form, a copy of which he did not get, and about which he knew nothing. His tender was quite in accordance with the advertisement.

The inquiry was adjourned; and on the resumption of the proceedings,

*Stephen Halpin*, a labourer in the gas-works, said the 103 tons of coal taken out of the works in 1904 by Messrs. Power were screened; and 20 tons of slack were left. Powers' men picked the coal out with shovels and forks. The coal came back, or was returned, in the ordinary way from a ship's cargo. The coal returned was supposed to be screened coal, but witness would not pay for it as such.

Mr. *M. Fitzgerald*, Secretary of the Gas Committee, said in March, 1901, the gas undertaking was £4629 in debt; and in March of last year they had a credit balance of £8269. During the interim period, the reserve fund had increased from £1440 to £2218. The profits for 1902 were £3815; for 1903, £3528; and for 1904, £3693. For 1910, the profits were £2344; and for 1911, £2030. The average cost of maintenance for the period 1902 to 1904 was £1529; and for the period 1910 to 1913, £2652. In 1902 to 1904 unscreened coal was used; but cannel coal was then obtained to increase the illuminating power of the gas, which it did, though it lessened the value of the coke very considerably. Since 1904, it was all screened coal that was used, with the exception of a few trial cargoes. Owing to the purity of Twechar coal, there was no doubt that a saving of £300 a year had been effected. The complaints of consumers about the quality of the gas ceased when screened coal was employed. Since 1904, 58 consumers had cancelled their accounts, by reason of their becoming users of electricity. He believed the Auditor was right in stating, in 1905, that the reduction of income was due to the installation of electricity. In witness's opinion, the seven-day test was in favour of the Standish Arley coal. He followed precedent in having pay sheets signed out of the meeting. The Statute stating that the cheque should be signed at the meeting was not brought under his notice. For the year ending March, 1906, the Corporation got no free gas. In 1904, the net revenue per ton of coal carbonized was £2 3s. 0½d., and in 1908 it was £2 4s. 9d. He could not say whether Henley Green Arley coal was accepted in 1907 without a report or recommendation from the Engineer. He then gave details of coal accepted without tender and outside the contracts, and said he had nothing in the minutes to show that this coal was obtained for test purposes. In 1908, Alderman Donnellan suggested that cargoes of coal should be taken for trial purposes outside the contracts. Mr. Bourke's

tender for retort-house repairs was rejected merely because it was not made on the proper printed form.

The INSPECTOR pointed out that another tender was informal, as the proposal was not filled in; and in a third tender the surety bond had not been complied with.

*Witness* said he was not aware that one of those tendering was only a school-boy.

Mr. BOURKE: I have a certificate showing he is only nineteen years of age.

*Witness* (continuing) described as untrue the story about slack coal being supplied in exchange for screened coal. The certificate from the colliery stated that it was "Twechar steam gas coal."

Mr. *W. Holliday* said when he was elected as consumers' representative on the Gas Committee, he found matters in a perilous state, owing to the chronic ill-health of the then Secretary and Engineer. Mr. Henry Hawkins, the new Engineer, by his zeal and honesty of purpose, had made great improvements. The Corporation Special Committee had not a good word to say for the Gas Committee, though they had given thousands of pounds in relief of rates. The price of gas now compared favourably with that in any city in Ireland; and the quality had considerably improved, as they could give 17-candle power, whereas in Dublin only 14-candle power was given. And, again, though Dublin and Belfast were allowed to supply carburetted water gas, Limerick did no such thing, confining the supply to pure coal gas. The Special Committee would have been better employed looking into the affairs of the Electricity Department. Had they done this, the ratepayers might not have to pay an annual sum of £1500 to make good a loss. The Gas Committee had, during the past ten years, lifted the undertaking out of an indebtedness of £4625, given it a credit balance of £8269, created a reserve fund of £3000, at the same time paying £5268 to the Corporation in relief of rates, while providing public lighting to the city at a loss of £600 a year. The total sum saved to the citizens by the Committee during the period referred to was, he calculated, £15,097. If the gas-works were put up for sale, despite the presence of electric lighting in the city, they would easily realize £100,000. The Committee had never placed any restriction in the way of tenders from colliery factors; but, as they would not deliver to the works, it was more advantageous to have a local contractor.

Mr. *T. Ryan* denied Mr. M. O'Brien's charge. The purchase of 490 tons of coal from the Limerick Steamship Company was due to shortage of coal in the gas-store, and the national coal strike. The purchase was absolutely necessary, and was made on the best possible terms. There had been no complaints against the contractors.

Mr. *Henry Hawkins*, the Gas Engineer, said the place was in a derelict state when he arrived to take charge. He attributed the choking of the gas-pipes to the bad condition of the coal carbonized. It took him two years to clear the mains. He gave evidence of various improvements. The coal lent to the contractor was lent on the principle that "one good turn deserves another." Messrs. Power had supplied coal when they ran short at the works. The coal used in Limerick was the best quality for gas that he had ever seen.

Mr. *J. F. Power*, Secretary of the Limerick Harbour Commissioners, said there was no foundation for the statement that his firm had supplied unscreened coal for screened coal. All the coal sold as screened was delivered as such. The coal returned after the loan was certified as screened.

The INSPECTOR: I am satisfied on that point.

Mr. KELLY wished to emphasize that no complaint had been made by Mr. Hawkins or anyone else as to the quality of the coal, and he wished to say that the choking of the mains referred to in evidence was due to the bad state of the purifier and the defective condition of the machinery, which had cost thousands of pounds in repairing. There could be no objection to the Gas Committee buying high-class coal, but they should do so by proper competition.

The INSPECTOR: I think that has been done. He added that he was very much impressed by the manner in which the books and accounts of the gas undertaking had been kept He thought Mr. Fitzgerald had marched with the times. His books were admirably kept.

The inquiry then concluded; and the Inspector's report is expected to be received in a few weeks.

## Portsmouth Corporation and the Gas-Works.

The initial step towards the proposed municipalization of the Portsea Island Gas Company's undertaking, to which reference was made last week, was affirmed by the Portsmouth Town Council, at their meeting last Tuesday, when it was agreed that the Finance Committee should be authorized to make official inquiries, and then formulate a report. The Chairman (Mr. H. R. Pink) stated that the present time was most opportune for the purchase, as the Company had reached their highest dividends, and had a good reserve fund. The shareholders would be entitled to receive from Corporation stock a sum equal to the amount now distributed half yearly in dividend, and the Directors would be paid out in a similar way. The town would become possessed of one of the best bargains they had ever had a chance of making; and if the purchase was effected, they would proceed to manufacture gas of greater calorific value than that now produced, and at a similar cost. There was, however, some amount of opposition to the proposal; one speaker asserting that gas had had its day, and expressing the opinion that it would be superseded by the advance of electricity.

**Additional Water Supply for Belfast.**—The Belfast City and District Water Commissioners recently made their annual inspection of the water-works at Woodburn, when the Chairman (Mr. W. T. Braithwaite) turned on the valve supplying the city from an enlarged reservoir, which will give a storage of 528 million gallons of water, or 127 million gallons more than hitherto. At a meeting of the Commissioners, it was reported that the quantity of water in store was 2484 million gallons; being 17 million gallons less than on the corresponding date (June 26) in 1912—a decrease accounted for by the fact that last year there was in June a spell of very wet weather, while this year more water was being drawn off than was getting into the reservoirs.

## LONDON COUNTY COUNCIL AND HIGH-PRESSURE GAS-METERS.

### Proposed Legislation for Testing.

At the Meeting of the London County Council to-day, the Public Control Committee will submit the following report on the subject of testing high-pressure gas-meters.

The increasing use of high-pressure gas, both for lighting and industrial purposes, has necessitated the use of special meters strengthened to withstand the high pressures, and with the necessary additions and alterations to the mechanism. Under the present law, as contained in the Sale of Gas Acts, 1859 and 1860, inspectors of gas-meters in London and elsewhere have no statutory authority to apply tests other than those prescribed in such Acts. These tests are of little or no value if the meter is to be used for high-pressure gas; and we think, therefore, that it is undesirable, in the present circumstances, for such tests to be made. We understand that the Board of Trade has for some time had under consideration the question of the verification of meters of this class, but that no definite action has been decided upon. The matter has now, however, become so urgent, both on the grounds of public safety and in the interests of the consumer, that we are strongly of opinion that the Council should take the necessary steps, by itself promoting legislation, to enable it effectively to deal with the matter. We accordingly suggest that the Council should seek fresh legislation to provide that no meters for measuring high-pressure gas shall be used in London unless they have been specially tested and verified for the purpose by the Council or some other local authority under the above-named Acts. The Council's existing testing plant would have to be supplemented to enable these special tests to be carried out; but there would be an increase in the amounts receivable for testing.

To attain the object we have in view, we are advised that it will be necessary to proceed under the provisions of the Borough Funds Act, 1872, as applied by the County Councils (Bills in Parliament) Act, 1903. Ten clear days' notice will, therefore, have to be given by public advertisement that the question of promoting legislation dealing with the question will be considered by the Council at a meeting to be held on a specified date, which we suggest should be July 29, 1913. It will then be necessary for the Council to pass a resolution to promote such legislation and to defray the cost and expenses of so doing out of the county fund. Such resolution must be passed by an absolute majority of the whole number of the Council; and subsequently, under section 4 of the Act, the Council will have to obtain the approval of the Local Government Board to the course of action to be taken. If the recommendation which we now submit is adopted, we propose to submit to the Council for consideration on the day above named a definite recommendation to make application to Parliament on the subject. We recommend "That notice be given by public advertisement of the intention of the Council to consider, at its meeting on July 29, 1913, a proposal that it shall take the necessary measures for promoting, in the session of Parliament of 1914, legislation relative to the testing of high-pressure gas-meters for use in the County of London, and to defray out of the county fund the cost and expenses of so doing."

## FATALITY AT THE BECKTON GAS-WORKS.

Mr. G. E. Hilleary, the Coroner for the County Borough of West Ham, held an inquiry last Friday relative to the death of George Jordan (43), a labourer lately employed at the Beckton Gas-Works, which occurred in the Seamen's Hospital on the 2nd inst.

Mr. C. BEASLEY ROBINSON (Messrs. Monier Williams, Robinson, and Milroy) attended on behalf of the Gaslight and Coke Company; and Mr. SYDNEY SHUTER, one of the Inspectors of Factories, represented the Home Office.

*Joseph Aylet* said he started work with deceased just after six o'clock on the morning of the 9th inst. at No. 13 still, which had an iron tower in ten sections, with an iron door back and front about 18 inches square, which was secured by means of an iron bar; one end being fixed on a hinge, and the other passing through an iron lug. This was pushed outwards to allow the bar to go through when the doors were closed, and the bar projected a little more than 2 inches outside the lug, When the stills were working, there would be a pressure of about 9 lbs. The deceased was washing out the still, which was done every morning. He had been working twenty minutes, and had gone up about three cocks. They had not a ladder at the back, but had to get up the first lot of spigots, and then climb up the dog-bars. He heard a report, shut off the steam, and found deceased crawling on his hands and knees on the bottom still. After the accident, he examined the still, and found the third door had blown open; but nothing was broken. The lug was forced outwards; he could not say how. He did not think a slip would do it. It was feasible that deceased might have slipped and caught his foot on the lug which might have forced the door open, but it was impossible to say.

In answer to Mr. ROBINSON, witness said he had been engaged on the stills for three years, and had never known of an accident before. He had examined the fittings and doors, and they were quite sound.

By the INSPECTOR: When they put the door back, they fastened the screw as tightly as they could. At the back of the wall there were two planks; but a man could only stand on them as far as he could reach with his hand, and then he had to climb up the dogs. There was room for staging, and then a man could go on from stage to stage, which might possibly obviate the necessity of climbing up the dogs.

*Charles Strickland*, foreman of the ammonia and chemical department at the works, said he had examined the tower, and found nothing broken. He thought the deceased must have put his foot against the lug, and forced it out. He had never known a door open before.

By Mr. ROBINSON: There was a movable ladder there. The lug could not be pushed aside when fastened tight.

*Albert Burton*, foreman fitter, said the doors must have been pro-

perly fixed, or there would have been a leakage; and there was none on the day of the accident. They took every precaution not to lose any of the liquor.

Another witness deposed to there being no leakage.

Dr. *Hugh John M'Cow*, House Surgeon at the Seamen's Hospital, said the deceased was brought there on the 9th inst. suffering from extensive burns over the whole of this body and limbs, and died about half-past two o'clock the same day; the cause of death being shock and exhaustion following the burns.

The CORONER having summed up,

The JURY returned a verdict of "Accidental death;" adding that precautions should be taken to prevent the men from stepping on the dogs or iron bars.

## CARLISLE GAS ACCOUNTS.

### Mr. Bloor's Services Acknowledged.

The minutes of the Gas Committee which were submitted at the monthly meeting of the Carlisle City Council last Tuesday contained a recommendation that £3000 out of the profits of the gas undertaking for the past year be transferred to the reserve fund, and that the balance of £5608 be paid over to the city fund. The following resolution was also included: "That this being the last occasion on which Mr. H. E. Bloor, the Gas Engineer and Manager, will attend this Committee prior to his leaving Carlisle to enter upon the duties of his appointment as Engineer and Manager of the York Gas Company, the Committee desire to record their appreciation of the ability, zeal, and courtesy displayed by him in the discharge of his duties and all matters within their province, and to express to him their best wishes for success in his future career."

In moving the adoption of the minutes, Mr. Buck said he thought it would be a source of satisfaction to the Council to note that the new Engineer would be able to take up his duties in Carlisle as early as Aug. 1; and while they welcomed the incoming Manager, it was only their duty to wish God-speed to him who was leaving them. Mr. Bloor had done well by the citizens of Carlisle. He had shown such energy in the discharge of his duties as to raise the quantity of gas sold in any one year above the maximum ever recorded; and the profits so accruing had been greater than ever recorded in the past. This was the more remarkable when they had been faced with such high prices for coal and oil as they had experienced during the past year. Mr. Bloor was leaving the employment of the Council with the Council's conviction that he had thrown his very best into his work, and had done his duty well. With regard to the tenders for 23,500 tons of coal (the normal quantity was about 25,000 tons), the Committee had done their very best; but it was manifest that the coal would cost them at least £1800 more than last year. They had left 1500 tons to be purchased if any fitting opportunity afforded. Dealing with the accounts, he pointed out that in the preceding year the amount spent on repairs at the works was £3884, whereas in the past year special items in the shape of new plant brought the total up to £5221. Taking these abnormal items into account, the gross profit for the year under review was really greater than that for the previous twelve months. The sale of gas to private consumers realized £1600 more, and receipts from residuals were up by £5089. The net profit of £8608 was one of which they might be proud or ashamed, according to the light in which they looked at it. The Committee asked to be allowed to retain in reserve £3000 to provide for future contingencies or any changes that might be decided upon, and pay over to the city fund £5608, which he thought was a very fair division. This would make the reserve £4500. It was no small work, even at the high price charged for gas, to effect such a result as he had stated to them; and it was, no doubt, a great satisfaction to the retiring Engineer that he was leaving them in a much better position than he had found them. They wished him every success in the new sphere he had found for his energy and skill.

In the course of a lengthy debate, Mr. White urged that there was no need for withholding from the ratepayers the £3000 referred to. It was, he said, contrary to custom, and to the spirit and working of the Carlisle Gas Act of 1850. There was no need for any reserve fund at all. He therefore moved, as an amendment, that the Gas Committee's proposition be deleted, and that the profits be handed over to the city fund according to law. Mr. Buck said they were face to face with considerably higher prices for materials; and if they had to take into consideration the price of gas charged to consumers, it was necessary that they should reserve this £3000 in order to balance the possible effect of these increases in materials. The amendment was, however, carried by a large majority.

**Dewsbury and Whitley Upper Gas Supply.**—A letter from the Dewsbury Corporation Gas Department was read at the last meeting of the Whitley Upper Urban District Council, stating that the Gas Committee had visited Briestfield in response to an application for a supply of gas from residents in the neighbourhood. The Committee also visited the fringe of the Whitley Upper District, and came to the conclusion that they would be willing to consider at the same time the further extension of mains, if it was desired that ratepayers in the Whitley Upper District should have a supply of gas. It was resolved to inform Dewsbury that the matter was under consideration.

**Acock's Green and District Water Supply.**—The Water-Works Committee of the Birmingham Corporation, at their last meeting, had under consideration numerous complaints of the inadequacy of the supply of water in the Acock's Green, Olton, and Solihull district. The matter having been thoroughly investigated by the officials, the shortage was found to be due to the demand of the district having overtaken the means of supply. The present system of carrier mains was laid in 1903-4, and was estimated to suffice for fifteen years. Thus their full capacity has apparently been reached in ten years. An extensive scheme of carrier distribution mains was brought forward and sanctioned, and the work will be put in hand at once. The scheme will cost upwards of £30,000.

## OLDHAM GAS-WORKS RESULTS.

In his report to the Gas Committee on the working of the Oldham Corporation gas undertaking for the year ended March 25 last, Mr. Arthur Andrew (the General Manager) states that the gross revenue on gas-works account amounts to £193,590, and the gross expenditure to £149,967; the balance carried to profit and loss account being £43,623. Annuities, interest, and sinking fund figure at £27,118, making the net profit on the year's working £16,505, to which there is to be added £19,488 brought forward from the previous year. This gives a total of £35,993, from which is deducted £7500 transferred to the borough fund, and £1650 depreciation on gas-cookers, leaving a credit balance of £26,843 to be carried forward. The increased amount paid for coal and oil is equivalent to 1·756d. per 1000 cubic feet of gas sold. Against this, the amount received for residuals increased by 1·181d. per 1000 cubic feet, leaving the net increase paid for coal 0·575d. The net price realized per 1000 cubic feet of gas sold during the past year was 1s. 10·32d., as compared with 1s. 10·43d. in the year previous. The receipts from residual products—coke, tar, and ammoniacal liquor—have further improved; the amount realized per 1000 cubic feet of gas sold being 9·320d., as against 8·139d. during the preceding year, and 7·821d. in 1911. Wages were advanced during the year to all classes of workmen; the total amount of the additional charges entailed by these advances being approximately £2000 per annum. The amount standing to the credit of the reserve fund on March 25 was £47,445. The sum of £2000 has been taken out of the fund to meet the estimated value of portions of the retort-house and retorts which have been demolished to make room for an installation of vertical retorts at Hollinwood.

The quantity of gas made was 1,557,217,000 cubic feet (149,598,000 cubic feet were water gas), compared with 1,503,360,000 cubic feet in the year 1911-12; being an increase of 53,857,000 cubic feet, or 3·58 per cent. The following quantities of coal, oil, and benzol were used in the production of gas: Coal, 115,112 tons 3¾ cwt.; gas oil, 359,558 gallons; and benzol, 100,608 gallons. The average quantity of coal gas made per ton of coal carbonized during the past year was 12,228 cubic feet, compared with 12,155 cubic feet in the previous year. The quantity of gas unaccounted for was 76,967,000 cubic feet, or 4·94 per cent. of the make, compared with 71,294,000 cubic feet, or 4·74 per cent. before. The total number of meters fixed on the 25th of March last was 54,886, of which 6131 were of the prepayment type. There were 687 meters fixed in new premises and others in which gas had not previously been used; and 183 meters were permanently disconnected. The number of consumers at the close of the financial year was 50,200. The net increase in the number of additional cooking-stoves and grillers fixed during the year was 990. The total number in use on the 25th of March was 22,189, excluding stoves owned by consumers. There was an increase of 30,338,000 cubic feet in the gas consumed in houses and shops, and an increase of 18,629,000 cubic feet in that used in mills and workshops. The quantity consumed in workshops other than cotton mills increased to the extent of 27,057,000 cubic feet; while the consumption in cotton mills decreased by 8,428,000 cubic feet. This decrease is partly due to the further adoption of high-pressure lighting, and also to the partial stoppage of a number of mills owing to disputes with the workpeople.

In addition to selling and fixing gas-fires, the practice of supplying them, in addition to radiators and water-heaters, on simple hire terms, has been adopted. It is hoped that this policy will cause gas to be more extensively used for heating purposes, and thus help to minimize the smoke nuisance. Last year three lady inspectors were engaged to visit consumers' premises where gas-cookers are installed, for the purpose of ascertaining whether the cookers are being properly used and being kept in a satisfactory condition, and also to give simple instruction in the use of the cookers, if required. Though started as an experiment, the venture has been fully justified, and is likely to be permanent. From June 25, 1904, up to June, 1912, it had been the practice to supply and fix cookers without charge. Since the latter date, a charge has been made of 5s., 6s., or 7s. for fixing, according to the size of the cooker selected. No change has been made in the policy of letting out cookers free of hire rent.

At the Corporation station at Hollinwood, the four-lift spiral-guided gasholder, with a capacity of about 5¼ million cubic feet, was used to some extent during the past winter. It has been finally completed since March 25 last, and was formally inaugurated on June 4, by the Chairman (Alderman Herbert Wilde, J.P.). Progress has been made with the erection of the vertical retort installation at Hollinwood; and it is hoped to have it completed and ready for use some time during the present summer.

## HEREFORD CORPORATION GAS UNDERTAKING.

### Annual Report and Accounts.

The Gas Engineer and Manager of the Hereford Corporation (Mr. W. W. Townsend) has presented to the Gas Committee his report for the year ended the 25th of March. He states that during the year the increase in the sales of gas amounted to 4,655,300 cubic feet. The ordinary consumption was more by 2,471,700 cubic feet, the slot consumption by 3,005,760 feet, and the public lamps took 1,229,100 feet more. On the other hand, under contracts showed a decrease of 1,074,760 cubic feet, and under power of 976,500 feet. The decrease in the amount sold on contract, Mr. Townsend says, is due to economies effected by the Railway Companies. The amount of coal carbonized during the year was 13,413 tons, compared with 12,750 tons the previous year. Coal went up in price about 2s. per ton last year; but by buying a proportion of cheap unscreened coal, the average cost was kept down. The yield of gas fell off; but on the whole year the average make per ton came to 11,593 cubic feet, compared with 11,750 feet during the previous year. Considering the cost of labour in replacing the stock of coal after the strike, as well as the increased price of the coal, the net increase of 9d. per ton on the whole year is, he thinks, very satisfactory. The extra cost of coal shown by the accounts is £1076, part of which is the cost of the extra 663 tons carbonized,

and the balance is due to the increased price. The extra quantity of coal used produced a larger amount of residuals; and coke realized 5d. per ton more on the year, while tar also was sold at a higher price. Coke brought in a net revenue of £4359, which is £366 more; tar, £1126, which is £270 more; and sulphate, £1579, which is £59 more than the previous year. Most of the items of expenditure show decreases, in spite of the increased make of gas. On the credit side of the account, the increased sale of gas produced an increased revenue of £123 from ordinary consumers, and £537 from slot consumers; but the larger amount of gas used in the public lamps brought in no return, the Committee having decided to improve the lighting without increasing the charge.

The gross profit comes out at £3934, compared with £3865; and after payment of interest and sinking fund, a balance of £2471 is shown, out of which £1000 has been paid to the improvement fund, £342 spent on new lamps in the principal streets, and £1128 carried forward.

Mr. Townsend expresses the opinion that, with coal at its present price, and gas at 2s. 3d. per 1000 cubic feet, probably there will be further increases in the consumption as the public realize more fully the many uses to which a clean fuel such as coal gas can be put, and the advantage of being able to obtain heat as and when required, simply by turning a tap. Unfortunately, most of the economies it is possible to effect in the manufacture of gas are swallowed up by the continual increases in the price of the coal; and the current year will have to bear the increase on last year's contracts up to October, and after that a still further rise of about the same amount, because the new contracts will not be made at less than 1s. per ton advance. The current year may therefore show a very decided falling off in profits; but no effort will be spared in order to improve the results, if that be possible, and to effect economies.

Appended to the report are statistics of the working for the past and the preceding year; and these show that the gas made in the past twelve months (as per station-meter) was 152,593,000 cubic feet, the quantity distributed was 152,613,000 cubic feet, of which 145,482,340 feet was sold and accounted for, and 7,130,660 feet, or 4 6 per cent., was unaccounted for. There is a gratifying increase in the number of hired cookers, fires, and other appliances; and, in addition, a large number have been sold outright.

The revenue from the sale of gas and meter-rents last year was 2s. 4·4d. per 1000 cubic feet of gas sold, compared with 2s. 4·2d. in 1911-12; and the cost price of gas, after deducting the receipts from residuals and the profit on stoves and fittings, was 1s. 9·9d., against 1s. 9·5d. The gross profit per 1000 cubic feet was 6·5d., compared with 6·7d. The amount required to pay interest and sinking fund is 2·5d. per 1000 cubic feet, compared with 2·5d. (the same figure) before; making the net profit 4d., against 4·2d. per 1000 cubic feet.

## NOTTINGHAM GAS EMPLOYEES' STRIKE.

Judging from the continued failure to arrive at a settlement, escape from the *impasse* into which matters in relation to the trouble at the gas-meter repairing shops of the Nottingham Corporation have been allowed to drift, appears as remote as ever. For nearly twenty weeks the tinsmiths formerly employed at the Woodborough Road depôt have maintained their unyielding demeanour; and though there are not wanting signs that some of them are apparently weary of their enforced inactivity, the majority seem still content to leave the solution of the difficulty to the Executive of the National Amalgamation of Sheet Metal Workers, from which, as members, they continue to draw their weekly subsidies. Meanwhile, the embargo is being continued in regard to the shops, at which the old process of so-called "peaceful picketing" is daily observed.

The General Secretary of the Amalgamation paid a visit to the city last week; but there were no developments of moment following his coming. Mr. Gordon, in one of his last official letters to the Town Clerk, had intimated willingness upon the part of representatives of the Executive to meet the Gas Committee again; and some hope appeared to be entertained among the workmen that the communication might be attended by practical result. But obviously, from the immovable attitude in which the tinsmiths have persisted from the commencement of the trouble, such a conference would serve no useful purpose; and the Committee, at a meeting on Friday, refrained, not unnaturally, from taking further action.

Meanwhile, the outcome of the agitation for a sympathetic strike on the part of other Corporation employees is naturally being eagerly awaited by the disaffected hands, some of whom, at the risk of appearing to mar the supposed happy concord, have not been slow to indicate that they have not been so well supported by their labour comrades in the city as they had a right to expect. The matter in this aspect will be brought to an issue at a meeting which has been convened for Saturday next, when it may become known to what extent the other sections of Corporation workers are prepared to follow up their threats to come out in support of the former staff at the Woodborough Road shops. Present indications suggest the probability that, if stereotyped talk of an unsatisfying kind will meet the difficulty, there will be plenty available, but that for all practical purposes the tinsmiths will be allowed to "work out their own salvation" in connection with their inordinately protracted labour struggle.

## WORKINGTON AND VERTICAL RETORTS.

### Report by a Deputation.

Among the matters dealt with by the Gas Committee in the minutes submitted at a recent meeting of the Workington Town Council was the report of a deputation consisting of the Mayor (Alderman R. E. Highton), Councillor Dodgson, and the Gas Engineer and Manager (Mr. E. G. Hutchinson), appointed to inquire into the various systems of carbonization. The report was in the following terms.

In presenting our report, perhaps it would be well to remind you that the condition of our carbonizing plant is such as to make it imperative that within two years another plant must be in actual operation, and that, fortunately, we can go on till then without incurring any expense in renewing the retorts. But that is the limit. Capital expenditure is therefore a necessity. With the ever-increasing price of coal, and the increasing demand for gas, it is essential that the most modern plant, suited to our local conditions, should be installed in our works. We have spared neither time nor trouble in trying to solve this problem; and, fortunately, we have been able, on the evidence of what we have seen and heard, together with the reports and opinions obtained of some of the greatest experts in the country, to arrive at a unanimous decision. In the course of our visits to various works, we have seen every form of plant in actual operation, and had facilities granted to us of seeing yields, costs, repairs, &c., of machine-stoked horizontals, inclines, and four types of verticals—Dempster, Dessau, Glover-West, and Woodall-Duckham. Any of these systems would be an advance on our practice of hand-stoked horizontals. We think it will help you to appreciate the respective merits of the various systems if we give you the carbonizing costs of each as given to us in an exceedingly well-managed works, where three systems are working side by side—hand-stoking horizontals, 2s. 9d. per ton of coal carbonized; inclines (machine-worked), 1s. 5d. per ton of coal carbonized; verticals, 6d. per ton of coal carbonized. Our own carbonizing cost was 3s. per ton of coal carbonized for the year ended March 31 last.

Without hesitation or reserve, we recommend that a vertical installation be put down here; and the following, among others, are our reasons for so doing: A reduction in the carbonizing costs of 2s. 3d. per ton—from 3s. to 9d. (and this should soon be further reduced); an increased yield of gas of at least 1000 cubic feet per ton of coal, together with increased yields of coke, sulphate of ammonia, and tar; and, in addition, an entire freedom from naphthalene troubles, smoke, steam, and dust; less clinkering of fires, and, consequently, greatly improved labour conditions.

Put into figures, the saving would work out approximately as follows:

| | £ | s. | d. |
|---|---|---|---|
| Reduction in carbonizing costs—10,000 tons of coal at 2s. 3d. per ton | 1125 | 0 | 0 |
| 1000 cubic feet of gas (increased yield per ton of coal) by 10,000 tons, equals 10,000,000 cubic feet of gas, at 11,549 cubic feet per ton equals 865·8 tons of coal, at 15s. per ton | 650 | 0 | 0 |
| 1½ cwt more coke per ton of coal—10,000 tons of coal at 9d. per ton | 375 | 0 | 0 |
| Sulphate of ammonia—20 tons at £13 per ton | 260 | 0 | 0 |
| Tar—100 tons at £1 10s. per ton | 150 | 0 | 0 |
| Increased profit per annum | £2560 | 0 | 0 |

And if the output of gas increases, the profits would increase in ratio for every ton of coal used over the 10,000 tons—the quantity we carbonized last year. We further recommend that the Council should be asked to give the Committee authority to obtain tenders, and that in the meantime samples of Cumberland coal should be sent to two installations, and the results and working carefully noted.

It was unanimously recommended that the report be received and adopted, that the Council authorize the Gas Committee to obtain tenders for the erection of a vertical installation, and that in the meantime samples of Cumberland coal be sent to two installations and the results and working carefully noted.

In moving the adoption of the minutes (which was agreed to), Mr. Hall said he could not add anything useful to the report which had been submitted. It was a carefully considered judgment, and over 2000 miles had been travelled to obtain the information laid before them. He spoke of the kindness and courtesy extended to the deputation by the different engineers and managers they had met; and added that the whole of the staff, the data, and the plant were placed at their disposal for two or three hours at each works visited.

## Belfast Water Board Finances.

Mr. G. Bryan, Auditor to the Local Government Board for Ireland, reporting on the accounts of the Belfast City and District Water Commissioners for the year ended in October last, states that the expenditure was £9613, less £558 transferred from revenue for depreciation in the value of water-meters; bringing the total capital expenditure up to £2,101,498. The income for the year amounted to £113,889, and exceeded the expenditure by £4687, bringing the balance in favour of the revenue account up to £65,345. The cost of promoting the Belfast Water Bill of 1912 was £2132, which was paid out of the year's revenue. The excess of receipts over expenditure for the previous four years was: 1908, £6792; 1909, £3613; 1910, £7059; 1911, £9425. It is noted that during the period of five years the Commissioners were relieved of the necessity of contributing to the sinking fund prescribed by the Water Acts of 1893, 1897, and 1899, and that the power to postpone these payments ceases in the current year; entailing an additional annual charge on the funds of about £10,000. The sinking fund was augmented during the year by £12,628; bringing up to £205,439 the total accumulations of the fund. Mortgages representing £23,645 were paid off; and additional borrowings on mortgage took place to the extent of £38,387; making the total indebtedness under that head £324,235. At a recent meeting of the Commissioners, the Chairman (Mr. T. W. Braithwaite) described the report as satisfactory.

**Poisoning of Fish.**—In view of the allegations made as to the poisoning of fish by the discharge of tar into rivers and streams, the following may be of interest: "At the Rochester Admiralty Court last Saturday, it was decided to make a further protest to the Admiralty against the quantity of oil fuel allowed to escape into the River Medway from the depôt near the warships. Fishermen complained that the fish in the river were poisoned, and the fishery was suffering greatly in consequence. A juror declared that he had recently seen oil discharged from the fuel depôt at Port Victoria floating several miles up the river."

## NOTES FROM SCOTLAND.

**From Our Own Correspondent.**

*Saturday.*

**Edinburgh.**—The report from the Electric Lighting Committee shows an increase of 830,000 units, the major portion of which has been used for power; the consumption of current for this purpose having increased about 16½ per cent. in consequence of the addition of motors aggregating 783 H.P. The lighting rate was reduced by ½d. at the beginning of the year. The income has been £131,679, and shows a credit balance of £2179.

The wisdom of those who had charge of the water supply of Edinburgh about thirty years ago when they chose the Talla district as the watershed whence the supply of water to the city should be carried has been amply justified. The rainfall since the beginning of the year in this district has been as high as 29 inches; while at Glencorse and Gladhouse, the previous sources of supply, the rainfall has only been 16 and 17 inches. The Water Trustees have remitted to the Works Committee the recommendation of the Engineers to bring the North Pentland water to Fairmilehead.

**Glasgow.**—According to the preliminary intimations, the revenue for gas will amount to £1,021,000—an increase of £97,000 over the sum of £924,000 received last year. This is not the first time that the revenue has reached a million pounds, as this amount was exceeded also in 1908; but at that time the price was 4d. or 5d. above the present charge of 1s. 11d. to 1s. 4d. per 1000 cubic feet. Glasgow's consumption of gas exceeds 7000 million cubic feet—an increase of 513 millions, or 7·8 per cent.

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**Ayrshire.**—The lighting assessments for various districts have now been fixed, and generally show a decrease in amount. These vary as follows, for lighting only: Dreghorn 2d., increase ½d.; Dunlop 3d., decrease 1d.; Glengarnock 1d., decrease 1d.

**Bothwell.**—The Directors of the Bothwell and Uddingston Gas Company have instructed their Engineer (Mr. L. Hislop) to prepare plans and obtain estimates for an installation of vertical retorts capable of manufacturing 750,000 cubic feet of gas per twenty-four hours, with the necessary coal and coke handling plants, suitable for unloading coal and loading coke direct into railway trucks.

**Buckie.**—The Lighting Committee have been holding a conference with the Gas Company, on the invitation of the latter body, with reference to an improvement in the lighting of the town. The Town Council, after consideration of the report of the Committee, agreed to draw up a schedule for the improvement of the street lighting of the burgh and to get offers.

**Cardenden.**—The Directors of the Gas Company recommend a dividend of 6 per cent., owing to the great increase in the quantity of gas sold during the last year, amounting in cash to £2071 last year and £2413 this year—an increase of £342. The price of gas is to be reduced by 2½d. per 1000 cubic feet, despite the rise in the cost of coals. A sum of £350 is carried to the reserve fund.

**Darvel.**—Provost Jamieson, in moving the adoption of the minutes of the Gas Committee, pointed out that the profits were £263. Sales had increased, and so had the price of coals. They had used 1452 tons of coal; the make of gas being at the rate of 9974 cubic feet per ton. Leakage had been reduced to 8 per cent. It is proposed to purchase 1200 tons of coal, at the average price of 15s. 6d. per ton, or 1s. per ton more than last year.

**Hamilton.**—The balance-sheet of the Corporation Gas-Works was submitted at the monthly meeting of the Town Council. The total balance on the year's working, including the sum brought forward from last year, is £1560. The Committee recommend that £500, instead of £1000 as originally arranged, should be applied as a one-fifth instalment towards reducing the cost of the new plant, so that the balance then becomes £2060. A sum of £473 has been placed to the contingency and depreciation of working fund. Of the balance, £625 has been placed to the credit of the common good; leaving a sum of £1435 to be carried forward. The price of gas is to be continued at the present rates.

**Jedburgh.**—At the annual general meeting of the Gas Company, the profit was shown to be £391 – an increase of about £16 over last year. Coals have risen 4s. per ton in the last two years; and although this means a greater expenditure of £186 per annum, there is no intention of raising the price of gas. If the coals had remained at the former price, gas could have been reduced to 3s. 11d. per 1000 cubic feet. Mr. W. S. Easson, the Manager, is to be congratulated on reducing the leakage by 2 per cent.

**Kelty.**—At the annual meeting of shareholders of the Gas Company, the balance-sheet submitted showed a gross profit of £1348, enabling a dividend of 6 per cent. to be declared, and the carrying forward of a balance of £682. This was adopted. The balance-sheet also showed that the increase in the coal account had been met by a corresponding increase in the return from residuals. There was an increase of £426 in the amount received for gas sold. The report of the Manager, Mr. Henry Rule, which was considered highly satisfactory, showed an increase in the quantity of gas manufactured of 1,286,800 cubic feet; while the amount of gas sold had increased by 1,301,000 cubic feet, the number of consumers by 345. The number of hot-plates and stoves on hire was 1070, as compared with 920 the previous year. The price of gas would remain the same as in the two preceding years. The Manager's salary was increased by £10.

**Kirkcaldy.**—After paying interest on sinking-fund charges, the result of the year's working of the Electric Light Department is a net deficit of £27.

**Lochgelly.**—At the annual meeting of the Gas Company, a dividend of 7½ per cent. was declared, £600 was added to the reserve, and £666 carried forward.

**Saltcoats.**—At the meeting of the Saltcoats Gas Company, Limited, on Tuesday, the accounts for the year ended the 31st of May last showed a balance of £1965 to the credit of the profit and loss

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account, after providing for depreciation of the works; and the Directors recommended that a dividend of 8 per cent. and a bonus of 1 per cent., both free of tax, should be paid. These payments would absorb £1440, and leave £525 to be carried forward. This was agreed to. There was an increased consumption of rather more than 2 million cubic feet of gas in the twelve months. According to a statement prepared by the Engineer and Manager (Mr. J. Napier Myers), of the 31,879,000 cubic feet of gas made, 30,095,600 cubic feet were accounted for; and the make per ton of coal was 10,213 cubic feet.

**Wishaw.**—The Gas Committee have decided to borrow the sum of £10,000 to defray the cost of the new holder and also the new gas-main in Kirk Road.

## CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July* 12.

**Sulphate of Ammonia.**

Throughout the week there has been little change in either the tone or the value of this article, although, if anything, prices have been slightly in sellers' favour. There has been a paucity of new direct business, but the demand for the covering of old contracts for July shipment has been fairly good. At the close, the quotations are £12 16s. 3d. to £12 17s. 6d. per ton f.o.b. Hull, £12 17s. 6d. to £12 18s. 9d. per ton f.o.b. Liverpool, and £12 18s. 9d. to £13 per ton f.o.b. Leith. In the forward position, it is reported that £13 5s. per ton, f.o.b. best ports, has been paid for September-December delivery in equal monthly quantities. For January-June makers continue to quote £13 10s. per ton f.o.b., but it has not transpired that they have recently obtained this figure.

**Nitrate of Soda.**

The market for this material is again somewhat easier, and the quotations on spot have been reduced to 11s. 4½d. per cwt. for ordinary quality, and 11s. 7½d. for refined.

LONDON, *July* 14.

**Tar Products.**

The markets for tar products are still exceedingly quiet; and there is little or no business doing in any article. There is little fresh to report concerning pitch. The inquiry is practically *nil*; and the only thing that will induce consumers to purchase is a considerable reduction on present prices. Benzols are fairly steady, though there is some report of selling for the forward position at slightly lower figures. Naphthas continue quiet, and sales are difficult to arrange. In regard to crude carbolic, consumers have shown more inclination to do business during the past week, though not for the prompt position. Creosote keeps fairly steady, though there are some sales reported in the Midlands at slightly lower prices. These are probably accounted for by the fact that some consumers in this quarter cannot take their deliveries owing to the strike in the Black Country.

The average values during the week were: Tar, 25s. 3d. to 29s. 3d. Pitch, London, 41s. to 42s.; east coast, 40s. 6d. to 41s. 6d.; west coast, Manchester, 40s. to 41s.; Liverpool, 41s. to 42s.; Clyde, 41s. to 42s. Benzol, 90 per cent., naked, London, 1s. 0½d. to 1s. 1d.; North, 1s. to 1s. 0½d.; 50-90 per cent., naked, London, 10d. to 10½d.; North, 10d. Toluol, naked, London, 11d. to 11½d.; North, 11d. Crude naphtha, in bulk, London, 5¼d. to 5⅝d.; North, 4⅝d. to 5¼d. Solvent naphtha, naked, London, 11d. to 11½d.; North, 9d. to 9½d. f.o.b. Heavy naphtha, naked, London, 11½d. to 1s. f.o.b.; North, 10d. to 10½d. f.o.b. Creosote, in bulk, London, 3⅛d. to 3¼d.; North, 2⅝d. to 3d. Heavy oils, in bulk, 3¼d. to 3⅝d. Carbolic acid, casks included, 60 per cent., prompt, east and west coasts, 1s. 3d. to 1s. 3½d. Naphthalene, £5 to £9; salts, 50s. to 55s., bags included. Anthracene, "A" quality, 1½d. to 1⅝d. per unit, packages included and delivered.

**Sulphate of Ammonia.**

There has again been a very quiet week in the market for this article. Buyers are still holding off; and although some reduced prices have been put before them, they still show no inclination to purchase. Outside London makes continue to be quoted at £12 5s.; Hull, £12 16s. 3d.; Liverpool, £12 17s. 6d.; Leith, £12 18s. 9d. to £13; Middlesbrough, £12 16s. 3d. to £12 17s. 6d.

## COAL TRADE REPORTS.

**Northern Coal Trade.**

There is a rather fuller demand for coal for export, and the home consumption appears to be active. In steam coals, best Northumbrians are about 15s. 1½d. to 15s. 4d. per ton f.o.b. For second-class steams, from 13s. 3d. per ton is quoted, and steam smalls are quiet at 8s. to 9s. 9d. per ton f.o.b. Production seems to be better maintained; and there is a fair forward inquiry. In the gas coal trade, best Durhams are from 14s. 10½d. to 15s. per ton f.o.b. Second-class gas are from 13s. 6d. to 14s. per ton; while for "Wear specials" the current quotation is from 15s. 3d. to 15s. 6d. Generally, there is an increasing demand for gas coal; and some of the chief collieries are well booked forward. Contracts, however, are not very rapidly settled, as some buyers seem to expect lower prices to rule. But there is as yet no sign of any reduction of the heavy cost of production of coal, though in a few cases there are rather lower sea-freights ruling; and this may reduce the price of gas coal delivered at ports such as Genoa. Coke is generally steady. Good gas coke is in only moderate output, and is quoted at about 18s. per ton f.o.b. in the Tyne.

**Scotch Coal Trade.**

A firm tone characterizes the Scotch coal trade in all departments. From several quarters complaints have come to the effect that tonnage


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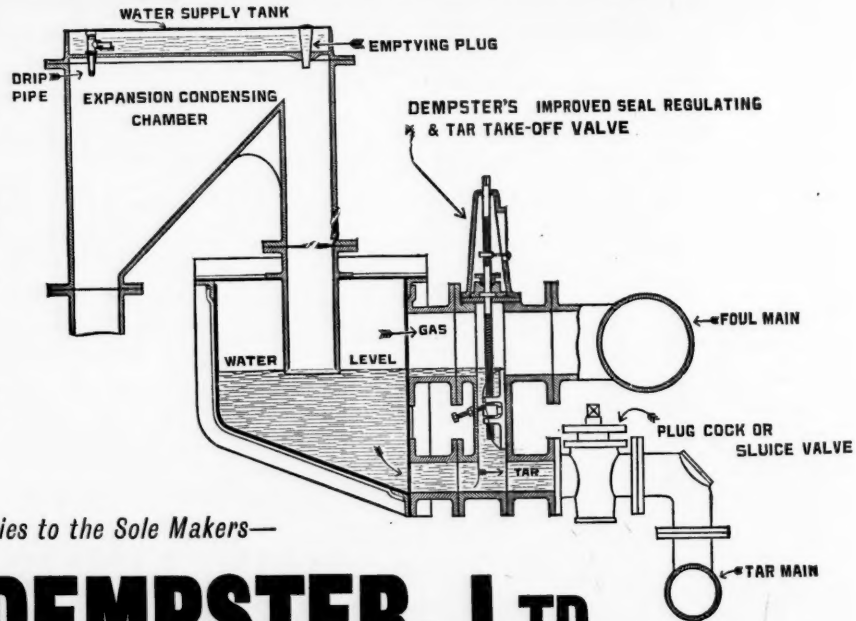
## Prevents Stopped Ascension Pipes.

**"The Cost is moderate and can be saved in a Single Season."**

**"The Arch Pipes can be seen in operation upon application."**

**"It will pay you to try them upon troublesome Pipes."**

**Upwards of 400 are already at Work or on Order.**

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# R. & J. DEMPSTER, LTD.,

GAS PLANT WORKS, **MANCHESTER.**

is scarce and intermittent. On the Glasgow Coal Exchange, on Monday, the following prices were quoted: Ell coal, best brands, 12s. 6d.; splint, 12s. 9d. to 15s.; navigations, best, 16s. 6d. to 17s.; ordinary steams, 11s. to 12s.; Hartleys, 14s. 6d.; trebles, 12s. 6d.; doubles, 11s. 9d.; singles, 11s. 3d.; pearls, 10s. 6d.; dross, 6s. to 8s. 6d., f.o.b., Glasgow.

## Widnes Gas and Water Manager and his Duties.

A motion was introduced at the meeting of the Widnes Town Council last Tuesday that, in view of the large amount of capital involved in the extension and reconstruction of the gas undertaking, and with the object of securing and maintaining more efficient administration of this department, it was essential that the Gas and Water Engineer (Mr. Isaac Carr) should in the future devote his whole time to the interests of the department. Mr. Millar, who moved the resolution, said that in 1892 Mr. Carr was receiving £500 per annum, and £600 in 1896. Two years later, instead of giving him another increase, the Council granted him certain privileges in the way of undertaking outside consulting work. It had not stopped there; and in 1899 his salary was increased to £750, and in 1905 to £900 per annum. He (Mr. Millar) considered it was unfair to professional men that Mr. Carr should be receiving such a large salary and at the same time be allowed to compete with consulting engineers. The Corporation were at present spending £50,000 on the gas-works; and surely works of this magnitude required the whole time of their Engineer. Mr. Crawford said Mr. Carr had a contract with the Corporation that he should do outside work; and if it was broken, he was entitled to compensation. The motion was defeated by a large majority.

**Garsington (Oxon) Water Supply.**—In the House of Commons on Monday last week, Mr. Fleming asked the President of the Local Government Board whether he had had his attention called to the state of the water supply at Garsington (Oxon), and what steps he proposed to take to protect the inhabitants against the dangers of the existing system. Mr. Burns, in reply, said one of the Board's Medical Inspectors had already visited the village; and he was still in communication with the Rural District Council as to the steps which should be taken to improve the water supply where it is defective.

**Quality of Portsmouth Water.**—High compliment has been paid to the Portsmouth Water Company by the Medical Officer of Health in his annual report. He remarks: "We are now reaping the advantage of the excellent filter-beds provided by the Company, and during the year no sample has been taken which was not found to be clear and colourless; while the periodic analyses show that a high standard of purity was maintained. Had it not been for the filter-beds, the water would, after wet and stormy weather, have presented a cloudy and dirty appearance. Now, however, at all times of the year, the supply is pure, pleasant, and abundant."

## Projected "Palace of Light" for Nottingham.

We learn from our local correspondent that a project is on foot to erect, on a site covering 40 acres, a building to contain samples of Nottingham's principal industries, as represented by the lace and hosiery trades; and arrangements have been made for foreign manufacturers of these goods to exhibit their productions if so disposed. The building will include a "Palace of Light," the architecture of which will be Indian in character; and it is proposed to demonstrate therein the various methods of artificial lighting. Until a recent period, Nottingham stood well in need of such a demonstration; and, though the want—thanks to new managerial ideas—is not now of such a pressing nature, the exhibition will be not unwelcome. The display, according to present indications, is designed to have much more than local interest. The idea is apparently to bring together the best exhibits illustrative of up-to-date lighting arrangements, both from British and Continental centres; and if the realization does not fall short of the aim, the projected "Palace of Light," which will be open from May to October next year, may include examples of work meriting the close scrutiny of competent critics.

**Cheaper Gas at Loughborough.**—Great satisfaction was expressed by members of the Loughborough Town Council at an announcement by the Gas Committee that they had, as requested, considered the charges for gas with a view to a reduction being made, and had resolved that the price should be lowered by 2d. per 1000 cubic feet.

**Claim for a Fall into a Tar-Tank.**—The Recorder of Dublin (the Right Hon. T. L. O'Shaughnessy) last week refused an application by Patrick Hurley against the Alliance and Dublin Gas Company for workmen's compensation—an understanding being arrived at that he would be taken back to the Company's service. It appeared that the man had fallen into a tank containing tar and oil, which were cold, and he complained that he had since suffered from pain in the back. The Recorder asked whether a fall into tar and oil could do any harm beyond dirtying a person. Dr. C. Lapper thought that it would not; adding, amid laughter, that "it would be a good antiseptic."

**Gas Supply at Burton-on-Trent.**—At the meeting of the Burton-on-Trent Town Council last Thursday, the report of the Gas and Electricity Committee was presented by Mr. Tarver, who referred with gratification to the increase of 2,166,000 cubic feet in the amount of gas consumed, due, doubtless, to the use of cookers, which are prominently advertised in the local papers. He also drew attention to the fact that the Council now have a lady demonstrator, whose services are available for the profit of users of gas-cookers. The lady is Miss Edith M. Smith, and she is giving general satisfaction. In order that the storage plant may be fully equal to all the demands upon it, instructions have been given to Mr. R. S. Ramsden, the Assistant-Manager, to engage Messrs. Piggott and Co., Limited, of Birmingham, to repair one of the gasholders, which they erected in 1877.


HOT WATER TEXTS. No. 7.

With a good boiler the cost of heating water by gas, for domestic supply, is low enough to satisfy everyone, but the losses entailed by wasted heat can easily make the gas bill prohibitively high. Quite small faults or oversights can make all the difference between failure and success. Let us advise you, as we have a thoroughly expert staff. No job, or detail, or point is too small to have best consideration. Small points can make big differences.

JOHN WRIGHT & CO.,
"Hot Water Department,"
19-21, Queen Victoria St.,
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HOT WATER TEXTS. No. 8.

Where an existing Hot-Water System with separate Tank or Cylinder is in use, or in other cases where a Circulating Boiler is required, the most suitable apparatus is The CALEFACTOR—The last word in Gas-Heated Apparatus for the supply of Hot Water for all purposes, Domestic, Commercial, or Institution; for Baths, Scullery Sinks, Lavatory Basins, &c.

JOHN WRIGHT & CO.,
Essex Works,
BIRMINGHAM.

**Woking Public Lighting and the Price of Gas.**—The Woking Urban District Council have had before them a report by the Lighting Committee to the effect that they had considered tenders for the public lighting from the Gas Company for the whole district and from the Electric Supply Company for a portion of it. As the former tender was lower, the Committee recommended its acceptance—to expire in June, 1920. One member of the Council suggested that, in consideration of this fresh contract, the Company should make a reduction in the price of gas supplied to domestic consumers: and after some discussion, the following resolution was adopted: "The Council think that the time has arrived when the Gas Company should take the opportunity of making a reduction in the charge for domestic supply, especially for heating purposes."

**Kenilworth Gas Company.**—The sixtieth annual meeting of this Company was held last Wednesday—Mr. T. Kemp in the chair. In moving the adoption of the accounts, the Chairman stated that, after putting £200 to the reserve account, which now totalled £1500, there remained a balance of £854 available for payment of dividends. This satisfactory showing had been effected despite a rise of 2s. per ton in the price of coal. Although they were faced with a further rise of 1s. per ton in the price of coal, he had every confidence in stating that, with the expanding trade of the Company, they would have an equally good result in the coming year. Mr. T. Berridge, in seconding the motion, said the Company's make of gas had increased during the year by 380,000 cubic feet to 22,488,000 cubic feet. More pleasing was the record as to leakage, which had been reduced in twelve years from 15 to 6 per cent. Necessary extensions and some extensive renewals had been made during the past year; and, as shown by the accounts, the Company were in a very strong position. The accounts were adopted. At the close of the meeting, it was decided to increase the capital from £12,500 to £15,000.

**Water Supply in Bradford Out-Districts.**—In the course of the proceedings on the Bradford Corporation Bill, a clause giving the Corporation the "exclusive" right to supply water within their limits was objected to by the representative of the Local Government Board, who thought the use of the word was intolerable. The Water Engineer (Mr. James Watson, M.Inst.C.E.) said none of the 25 townships within the water limits of the Corporation had any objections to it. They had had complaints of the vagueness of former provisions, and the word was necessary to make the position perfectly plain. On behalf of the Corporation, it was also contended that under the Bill they would have a definite obligation to supply throughout the area, either in bulk or retail; and if they were to fulfil these obligations they must have clearly expressed the exclusive right to supply. In allowing the clause, the Chairman explained that, while the Committee had a strong objection to the use of the word "exclusive," they granted it because of the strength of the evidence that had been adduced as to the circumstances of Bradford in relation to the out-townships being absolutely exceptional.

## APPLICATIONS FOR LETTERS PATENT.

15,019.—ARNDT, M., "Pyrometers, gas analysis apparatus, and the like." June 30.
15,037.—JULIUS PINTSCH AKT.-GES. "Inverted lamps." June 30.
15,038.—JULIUS PINTSCH AKT.-GES. "Lighting railway carriages with gas." June 30.
15,040.—SIBLEY, J. T., "Incandescent lighting." June 30.
15,041.—SIBLEY, J. T., "Gas-turbines." June 30.
15,051.—TRAVERSAY, C. G. P. S. DE, "Safety devices for gas-lighting." June 30.
15,080.—REDFERN, C. G., "Gas lighting for railway coaches." A communication from the Julius Pintsch Akt.-Ges. June 30.
15,081.—JULIUS PINTSCH AKT.-GES. "Inverted burner." June 30.
15,082-3-4.—JULIUS PINTSCH AKT.-GES. "Lighting plant for railway coaches." June 30.
15,085.—JULIUS PINTSCH AKT.-GES. "Inverted burner." June 30.
15,094.—JULIUS PINTSCH AKT.-GES. "Measuring gas." June 30.
15,095.—JULIUS PINTSCH AKT.-GES. "Burners." June 30.
15,105.—WILLIAMS, A. F., "Lining artesian wells." June 30.
15,196.—JUNKERS, H., "Geysers." July 1.
15,255.—COMPAGNIE POUR LA FABRICATION DES COMPTEURS ET MATÉRIEL D'USINES À GAZ. "Dry gas-meters." July 2.
15,271.—HANAPPE, E., "Safety devices for automatically cutting-off the discharge of gas from gasholders." July 2.
15,289.—WADE, H., "Gas-engines." A communication from Ehrhardt and Sehmer G.m.b.H. July 2.
15,330.—HOBSON, W., "Gas-stoves." July 3.
15,337.—HIBBERD, C.E., and GOAD, F. L., "Coin-freed mechanism." July 3.
15,359.—HARROP, G., "Mantles." July 3.
15,366-7.—HOUSTON, P. T., "Suction-gas producers." July 3.
15,402.—SCHRÖTER, O., "Controlling burners from a distance." July 3.
15,454.—RICARDO, H. R., and CHORLTON, A. E. L., "Controlling the flow of fluids." July 4.
15,470.—BONECOURT SURFACE COMBUSTION, LTD., and RICHARDS, N. B., "Combustion of combustible mixtures." July 4.
15,472.—MELMORE, W. M., "Compressing gas." July 4.
15,483.—JENNINGS, S., "Gas-cooking apparatus." A communication from W. H. L. Dugmore. July 4.
15,517.—TOOLEY, H., "Gas-driven pumps." July 5.
15,558.—SOUTH METROPOLITAN GAS COMPANY, and CHANDLER, D., "High-pressure inverted mantles." July 5.

**Management of the Workington Gas Undertaking.**—The resignation by Mr. E. G. Hutchinson of the position of Gas Engineer to the Workington Corporation (consequent on his appointment to Carlisle) will take effect on the 31st inst. The Gas Committee, in accepting the resignation, congratulated Mr. Hutchinson on his new appointment.


PARKINSON
WATER HEATERS

The
"GACYLOTE"
HOT WATER TANK.
HOT WATER TO ANY TAP BELOW ITS LEVEL.

Easily Fixed—No Special Gas Pipe Needed.
Automatic in Action.
**15** Gallons of HOT WATER Always Ready.

A COMPLETE HOT WATER SYSTEM FOR
£6 15s. 0d.
WATER KEPT HOT WITH 2 FT. GAS PER HOUR.

THE PARKINSON STOVE CO., LTD.
(Incorporating Maughan's Patent Geyser Co.),
BIRMINGHAM and LONDON.

**Price of Gas at Pontefract.**—The Gas Committee of the Pontefract Corporation have recommended the Council to supply gas, as from the current month, at a reduction of 1d. per 1000 cubic feet to ordinary consumers, and to allow a discount of 2½ per cent. to them if their accounts are paid within one month after demand; also to grant a reduction of 2d. per 1000 cubic feet in respect of gas supplied through slot meters. The latest annual report of the undertaking shows a profit of £1306.

**Evesham District Water Scheme.**—The Local Government Board have granted the application of the Pebworth and Evesham Rural District Councils for a loan of £13,499 to defray the cost of a joint scheme of water supply for a number of places within their jurisdiction. The Councils have acquired the right to a maximum supply of 250,000 gallons of water a day from the sidings belonging to Lord Elcho in Lidcombe Wood, Stanway, on the Cotswold Hills. The Joint Committee have for some years supplied water to ten villages from their 40 or 50 miles of main; but the augmentation of the supply now sanctioned will enable them to provide water for other places in the district.

**Natural Gas near Peterborough.**—At Whittlesea, near Peterborough, a discovery of natural gas, which burns well, has just been made some 30 feet below the ground. The gas rose freely in the borehole, and burned with a bluish-yellow flame. The official report of the discovery is supplied by Messrs. Smithdale and Sons, engineers, of Acle, Norfolk, who are the contractors for some new drainage works. It seems that, while boring for the foundations, it was discovered that a strong supply of natural gas existed. Upon withdrawing their boring-rods, a distinct gurgling sound was heard, and gas with water came up freely. Messrs. Smithdale intend to make further investigations into the matter.

**Bradford and Free Cookers and Stoves.**—The supply of gas stoves, cookers, and fittings free of charge to customers was advocated at last week's meeting of the Bradford City Council by Mr. Brown, who urged that it was the correct principle to work upon. These appliances, he said, ought to be regarded simply as means by which the Corporation could convey to the consumers the commodity they were selling. Other members spoke in favour of this course—the mitigation of the smoke nuisance being put forward as a reason for its adoption. The Chairman of the Gas Committee (Mr. Barraclough) stated that the Committee were sympathetically disposed towards the suggestion that the use of gas cookers and heaters should be encouraged, and might be relied upon to do what they could in this direction.

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During the proceedings on the Leeds Corporation Bill before the Unopposed Bills Committee of the House of Commons last week, a question was asked by a member as to the provision made for the men at the water-works under construction. In reply, the Water Engineer (Mr. C. G. Henzell, M.Inst.C.E.) stated that the Corporation had one of the best systems in England. In all his thirty years' experience, he had never seen anything like it.

The Davis Gas-Stove Company held their half-yearly "Travellers' Conference" at Luton last Friday week—the whole of the selling staff being present. The feature of the conference was "the very great interest evinced with regard to the hygienic efficiency of gas-fires. Each representative present expressed his determination to do all that was possible to back up the Company's policy of bringing home to everyone interested in the subject the importance of taking infinite care that no gas-fire be fixed in a consumer's house if it is not hygienically perfect."

## GAS COMPANIES' STOCK AND SHARE LIST.

The Stock Exchange certainly had a better time last week, though chequered with alternations of sunshine and shadow; and a favourable point was that it finished up quite cheerfully. Business, however, was very quiet; for much of the dealing was professional, and the public are too shy to launch out at all. The chief factor of unrest was, of course, the Balkans, with the certainty that heavy fighting was in progress, and, at the same time, the absence of all trustworthy information regarding it. Still, markets have not done badly on the whole, and closed firm. The settlement of the fortnightly account was a light one and, apparently, not difficult. The opening on Monday was brightened by reassuring news regarding the Rand strike; and some buying back put prices on the rise, though business was not very active. Government issues were stronger, and Consols advanced. Rails rose and, in spite of some uncertainty later, closed at an advance. Americans were firmer. On Tuesday, the settlement was beginning, and fresh business was dead-slow. Prices became sensitive, and gave way all round. Consols were a little easier for the account; and Rails, American, and Foreign were down. Wednesday revealed some weakness in special lines which caused some unrest. Government issues did not feel the influence; but the rest were mostly lower. The opening on Thursday was not strong, owing to misgivings as to Balkan affairs and unfavourable Continental advices. But later a favourable turn came; and, aided by "bears" closing, a moderate improvement was achieved. Rails were stronger, and prices pushed up. Americans, too, were firmer. But Government issues were not in it, and Consols marked 72⅛ again. Friday was uneasy at first, and prices generally were reduced on Balkan fears, but steadied later and looked up. Consols recovered, and Rails were mostly better, though with one or two indifferent spots. Foreign were firm. On Saturday, the tone was brightened by the aspect of Bulgaria's weakness making for peace. Markets took heart, and "bears" were busy closing; so that prices showed general improvement. Consols closed at 72⅛ to 72⅛—a rise of ⅛ in the week. In the Money Market, there was some demand for the settlement; but rates afterwards relaxed and closed easy. Business in the Gas Market was again devoid of any salient feature except the irregularity of its distribution. Almost the whole of it was confined to the three big issues—Gaslight ordinary, South Metropolitan, and Imperial Continental. Variations in quotation were few and slight, and about equally balanced between ups and downs; but the principal issues showed prices which were on the rise. In Gaslight and Coke, the ordinary was pretty active, and, after opening at par, pushed up to 101. In the secured issues, the maximum marked 76⅛ to 77½ (a fall of 1), the preference 96 to 98, and the debenture 72½ and 73½. South Metropolitan was only moderately busy, but showed strength at 108½ to 110. In Commercials, there was only a bargain at 70 in the debenture. Among the Suburban and Provincial group, Alliance and Dublin realized 70 (a fall of 1⅛), British 45⅝ to 45⅞, South Suburban 118, Wandsworth "B" 133, and ditto debenture 68½. On the local Exchange, Liverpool "A" fetched 209. In the Continental companies, Imperial changed hands at 163¼ to 166 (a rise of 1), and European at 17⅞ to 18⅛. Among the undertakings of the remoter world, Monte Video marked 12½ and 12⅝, Primitiva 6⅛, and ditto preference 4 15/16 and 5.

| Issue. | Share. | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|
| £ | | | p.c. | | | | £ s. d. |
| 1,551,868 | Stk. | April 11 | 5 | Alliance & Dublin Ord. | 67⅛–70½ | −1⅛ | 7 1 10 |
| 374,000 | ,, | July 11 | 4 | Do. 4 p.c. Deb. | 82–85* | .. | 4 14 2 |
| 280,000 | 5 | April 11 | 7½ | Bombay, Ltd. | 6¼–6⅜ | .. | 5 11 1 |
| 50,000 | 10 | Feb. 27 | 15 | Bournemouth Gas & Water | 10 p.c. 28½–29½ | .. | 5 1 8 |
| 332,000 | 10 | ,, | 7 | Do. B 7 p.c. | 15½–16 | .. | 4 7 6 |
| 75,000 | 10 | ,, | 6 | Do. Pref. 6 p.c. | 13⅝–14½ | .. | 4 4 3 |
| 880,000 | Stk. | Feb. 27 | 14 | Brentford Consolidated | 260–265 | .. | 5 5 8 |
| 880,000 | ,, | ,, | 11 | Do. New | 200–205 | .. | 5 7 4 |
| 60,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. | 113–115 | .. | 4 6 11 |
| 206,250 | ,, | June 13 | 4 | Do. 4 p.c. Deb. | 92–94 | .. | 4 5 1 |
| 217,380 | Stk. | Feb. 27 | 11 | Brighton & Hove Orig. | 206–211 | . | 5 4 3 |
| 244,200 | ,, | ,, | 8 | Do. A Ord. Stk. | 151–154 | .. | 5 3 11 |
| 530,000 | 20 | Mar. 28 | 12½ | British | 45–46 | .. | 5 8 8 |
| 120,000 | Stk. | June 27 | 4 | Do. 4 p.c. Deb. Stk. | 87–89 | .. | 4 9 11 |
| 245,771 | Stk. | ,, | 4 | Buenos Ayres 4 p.c. Deb. | 83½–91½ | .. | 4 7 5 |
| 100,000 | 10 | — | — | Cape Town & Dis., Ltd. | 2–3 | .. | — |
| 100,000 | 10 | — | — | Do. 4½ p.c. Pref. | 4–5 | .. | — |
| 100,000 | Stk. | June 27 | 4½ | Do. 4½ p.c. Deb. Stk. | 75–80 | .. | 5 12 6 |
| 157,150 | Stk. | Feb. 13 | 5 | Chester 5 p.c. Ord. | 109½–111½ | .. | 4 9 8 |
| 1,513,280 | Stk. | Feb. 27 | 5/9/4 | Commercial 4 p.c. Stk. | 105–107 | .. | 5 2 1 |
| 660,000 | ,, | ,, | 5¼ | Do. 3½ p.c. do. | 102–104 | .. | 5 2 6 |
| 475,000 | ,, | June 13 | 3 | Do. 3 p.c. Deb. Stk. | 69–71 | .. | 4 4 6 |
| 800,000 | Stk. | ,, | 4 | Continental Union, Ltd. | 80–83 | .. | 4 16 5 |
| 200,000 | ,, | ,, | 7 | Do. 7 p.c. Pref. | 124–126 | .. | 5 11 1 |
| 492,270 | Stk. | — | 5⅔ | Derby Con. Stk. | 124–125 | .. | 4 12 0 |
| 55,000 | ,, | — | 4 | Do. Deb. Stk. | 103–105 | .. | 3 16 2 |
| 1,002,180 | 10 | Jan. 16 | 10 | European, Ltd. | 17⅛–18⅛ | .. | 5 8 1 |
| 16,415,840 | Stk. | Feb. 13 | 4/17/4 | Gaslight and Coke 4 p.c. Ord. | 99⅛–101⅛ | .. | 4 15 10 |
| 2,600,000 | ,, | ,, | 3½ | Do. 3½ p.c. max. light and 4 p.c. Con. Pref. | 75–78 | −1 | 4 9 9 |
| 4,062,235 | ,, | ,, | 4 | | 95–98 | .. | 4 1 8 |
| 4,674,850 | ,, | June 13 | 3 | Coke 3 p.c. Con. Deb. | 71½–73½ | .. | 4 1 8 |
| 258,740 | Stk. | Mar. 13 | 5 | Hastings & St. L. 3½ p.c. | 89–91 | .. | 5 9 11 |
| 82,500 | ,, | ,, | 6½ | Do. do. 5 p.c. | — | .. | — |
| 70,000 | 10 | April 25 | 11 | Hongkong & China, Ltd. | 17–17½ | .. | 6 5 9 |
| 131,000 | Stk. | Mar. 13 | 7½ | Ilford A and C | 154–155 | .. | 4 18 4 |
| 65,780 | ,, | ,, | 6½ | Do. B | 120–122 | .. | 5 0 5 |
| 66,500 | ,, | June 27 | 4 | Do. 4 p.c. Deb. | 87–89 | .. | 4 9 11 |
| 4,940,000 | Stk. | May 16 | 9 | Imperial Continental | 162–167 | +1 | 5 7 9 |
| 1,335,000 | Stk. | Feb. 13 | 3½ | Do. 3½ p.c. Deb. Red. | 85–87 | .. | 4 0 6 |
| 200,342 | Stk. | Mar. 13 | 6 | Lea Bridge Ord. 5 p.c. | 120–123 | .. | 4 17 7 |
| 661,000 | Stk. | Feb. 27 | 10 | Liverpool United A | 208½–210½ | .. | 4 15 0 |
| 718,100 | ,, | ,, | 7 | Do. B | 143–151 | −1 | 4 12 9 |
| 306,083 | ,, | June 27 | 4 | Do. Deb. Stk. | 96–98 | .. | 4 1 8 |
| 63,480 | Stk. | June 27 | 3 | Maidstone 3 p.c. Deb. | 66⅛–68⅛ | .. | 4 7 7 |
| 75,000 | 5 | June 13 | 6 | Malta & Mediterranean | 4⅜–4⅝ | .. | 6 3 1 |
| 250,000 | 100 | April 1 | 4½ | Met. of Melbourne 4½ p.c. Deb. | 98–100 | .. | 4 10 0 |
| 541,920 | 20 | May 30 | 4 | Monte Video, Ltd. | 12⅛–13 | .. | 6 3 1 |
| 1,775,892 | Stk. | Feb. 27 | 4½ | Newc'tle & G'tesh'd Con. | 98–99 | .. | 4 10 11 |
| 529,705 | Stk. | June 27 | 3½ | Do. 3½ p.c. Deb. | 83½–84½ | .. | 4 2 10 |
| 55,940 | 10 | Feb. 27 | 7/7/0 | North Middlesex 7 p.c. | 13–14 | .. | 5 4 7 |
| 300,000 | Stk. | May 16 | 8 | Oriental, Ltd. | 124–129 | .. | 6 4 0 |
| 60,000 | 5 | Mar. 28 | 10 | Ottoman, Ltd. | 8¼–8⅜ | 4¼ | 5 14 3 |
| 60,000 | 50 | Feb. 27 | 13 | Portsea, Island B | 125–128 | .. | 5 1 7 |
| 100,000 | 50 | ,, | 12 | Do. C | 122–125 | .. | 4 16 0 |
| 249,980 | 5 | May 16 | 8 | Primitiva Ord. | 6⅜–6⅝ | .. | 6 8 0 |
| 499,960 | 5 | June 27 | 5 | ,, 5 p.c. Pref. | 4¾–5 | .. | 5 0 0 |
| 521,600 | 100 | June 2 | 4 | ,, 4 p.c. Deb. | 93–95 | .. | 4 4 3 |
| 846,198 | Stk. | June 27 | 4 | River Plate 4 p.c. Deb. | 90–92 | .. | 4 7 0 |
| 275,000 | 5 | Apl. 11 | 12 | San Paulo, Ltd. | — | .. | — |
| 150,000 | 10 | ,, | 6 | Do. 6 p.c. Pref. | 11¼–11⅝ | .. | 5 2 2 |
| 125,000 | 50 | July 1 | 5 | Do. 5 p.c. Deb. | 48–50 | .. | 5 0 0 |
| 135,000 | Stk. | Mar. 13 | 10 | Sheffield A | 225–227 | .. | 4 8 1 |
| 209,984 | ,, | ,, | 10 | Do. B | 225–227 | .. | 4 8 1 |
| 523,500 | ,, | ,, | 10 | Do. C | 224–226 | −1 | 4 8 6 |
| 90,000 | 10 | May 30 | 7½ | South African | 9½–10½ | .. | 7 2 10 |
| 6,429,895 | Stk. | Feb. 13 | 5/9/4 | South Met., 4 p.c. Ord. | 108–110 | .. | 4 19 4 |
| 1,895,445 | ,, | July 11 | 3 | Do. 3 p.c. Deb. | 71½–73½* | .. | 4 1 8 |
| 209,820 | Stk. | Feb. 27 | 8¾ | South Shields Con. Stk. | 161–163 | .. | 5 4 4 |
| 952,795 | Stk. | Feb. 27 | 6 | S'th Suburb'n Ord. 5 p.c. | 117–119 | .. | 5 0 10 |
| 60,000 | ,, | ,, | 5 | Do. 5 p.c. Pref. | 115–117 | .. | 4 5 6 |
| 117,058 | ,, | June 27 | 5 | Do. 5 p.c. Deb. Stk. | 115–117 | .. | 4 5 6 |
| 594,740 | Stk. | May 16 | 5 | Southampton Ord. | 102–105 | .. | 4 15 3 |
| 120,000 | Stk. | Feb. 13 | 7½ | Tottenham A 5 p.c. and B 3½ p.c. | 139–142 | .. | 5 2 1 |
| 483,940 | ,, | ,, | 5¾ | | 115–117 | .. | 4 18 3 |
| 149,470 | ,, | June 27 | 4 | Edmonton 4 p.c. Deb. | 90–92 | .. | 4 7 0 |
| 182,380 | 10 | ,, | 5 | Tuscan, Ltd. | 5–6 | .. | 8 6 8 |
| 149,900 | 10 | July 1 | 5 | Do. 5 p.c. Deb. Red. | 94–96 | .. | 5 4 2 |
| 286,476 | Stk. | Feb. 27 | 5 | Tynemouth, 5 p.c. max. | 114–115 | .. | 4 6 11 |
| | | | | Wandsworth, Wimbledon, and Epsom— | | | |
| 30,000 | Stk. | .. | .. | Wandsworth A 5 p.c. | 160–165 | .. | — |
| 255,636 | ,, | .. | .. | ,, B 3½ p.c. | 132–137 | .. | — |
| 108,075 | ,, | .. | .. | ,, C 3½ p.c. | 113–118 | .. | — |
| 352,000 | ,, | .. | .. | Wimbledon 5 p.c. | 110–115 | .. | — |
| 98,000 | ,, | .. | .. | Epsom 5 p.c. | 117–122 | .. | — |
| 88,416 | ,, | June 27 | 3 | 3 p.c. Deb. Stk. | 68–70 | .. | 4 5 9 |

Prices marked * are "Ex-Div."

The Partridge Green and District Water Company, Limited, has been registered with a capital of £1000, in £5 shares.

A company has been formed with a capital of £100,000, in £1 shares, to take over the business of Messrs. Weiss and Biheller, of Chiswell Street, E.C., merchants, manufacturers, and dealers in glass, china, incandescent mantles, and bulbs.

The Burnley Corporation are constructing a large reservoir at Hurstwood, and the Council have decided, owing to the failure of the contractors, that the Water Engineer should proceed by administration with the work of excavation at the north end of the main trench.

James Keith and Blackman Company, Limited, have sent a copy of a new catalogue they have issued (Nos. 7 and 8) which contains illustrated particulars of their lamps, compressors, and other lighting specialities. It is a 64-page booklet, printed in two colours, and stitched in a neat wrapper.

While a number of men engaged by Messrs. Gibbons Bros. were at work on some scaffolding at the Lum Street gas-works of the Bolton Corporation, the staging gave way, and about a dozen of them fell some 12 or 14 feet to the ground. Prompt assistance was rendered, and as the result of the accident one man was obliged to be detained in the infirmary.

Letters of allotment and regret have been posted for the issue of 30,000 ordinary shares of £1 each in the Humphrey Pump Company, Limited, for which applications were recently invited. It is stated that the issue was over-subscribed.

At the ordinary meeting of the Brentford Gas Company, on the 1st prox., the Directors will seek authority to raise a further sum of £100,000 new stock (1881); and an extraordinary general meeting will follow for the purpose of authorizing the Board to raise further capital by the issue of £25,000 4 per cent. perpetual debenture stock.

Readers of the "JOURNAL" are aware that Mr. William Arnott, the Manager of the South African Lighting Association, Limited, has resumed his duties at Port Elizabeth, after rather extended leave of absence. In addition to being a very capable and enterprising gas manager, Mr. Arnott is a skilful photographer; and he made good use of this accomplishment during his holiday. The results were shown in a lecture delivered to the Photographic Society, on the 22nd ult., which was so attractive that it filled every seat in the Loubser Hall. Mr. Arnott gave a delightful description of his tour, in the course of which he visited many interesting places; and at the close he was cordially thanked for the enjoyable evening he had given his audience.

## WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

### Appointments, &c., Vacant.

ASSISTANT ENGINEERS (Three). Sheffield Water Department. Applications by July 25.
ASSISTANT DISTRICT SUPERINTENDENT. No. 5760.
REPRESENTATIVE. No. 5761.
MECHANIC. Cleethorpes Gas-Works.

### Appointments, &c., Wanted.

CHEMICAL PLUMBER. Davies, Galloway Road, Shepherd's Bush, W.

### Gas-Works Wanted.

D. GORDON, 31, New Bond Street, W.

### Tank Trucks for Hire.

BROTHERTON AND CO., Leeds.
HOLMES AND CO., Northfleet.

### Plant (Second Hand) for Sale.

GASHOLDER, &c. Sleaford Gas-Works.
PURIFIERS. No. 5762.

### Meetings.

BAHIA BLANCA GAS COMPANY. No. 1, East India Avenue, E.C. July 24. 12.30 o'clock.
BRENTFORD GAS COMPANY. St. Ermin's Hotel. Aug. 1, 2.30 o'clock.
EUROPEAN GAS COMPANY. Finsbury House. July 22. Two o'clock.
SOUTH SUBURBAN GAS COMPANY. De Keyser's Hotel. Aug. 8. Three o'clock.

### Sales of Stocks and Shares.

SOUTHAMPTON GASLIGHT COMPANY. By Tender. July 21.

### TENDERS FOR

### Coal.

CLEATOR MOOR URBAN DISTRICT COUNCIL. Tenders by July 18.
HAVERHILL URBAN DISTRICT COUNCIL. Tenders by July 15.
NEWPORT (MON.) GAS COMPANY. Tenders by July 23.

### General Stores.

SALFORD GAS DEPARTMENT.

### Tar and Liquor.

WARE GASLIGHT COMPANY. Tenders by July 31.

### Tar for Roads.

YORK CORPORATION. Tenders by July 19.

## NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

*No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.*

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